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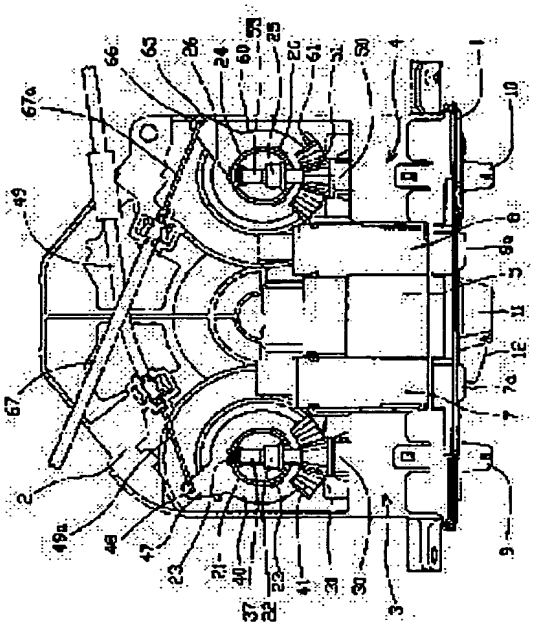
(54) HEATER CONTROL DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a heater control device wherein the rotational intervals of an operating knob are equally regulated even if the strokes of a linking member to link the operating knob to an air conditioner side member are not equally spaced.
SOLUTION: In this heater control device wherein a rotatably operated operating knob 9, a rotatable member 30 rotating integrally with the knob 9 and having a driving gear part 31 formed on it, a gear member 40 having a driven gear part 41 formed on it to be meshed with the gear part 31 of the rotatable member 30, and a linking member 49 to link the gear member 40 to the air conditioner side member are provided, and the air conditioner side member is driven in response to the rotation of the operating knob 9, a distance from the rotational center of an individual tooth of the gear part 31 is varied to change a transmission ratio to the gear member 40 in regard to the rotation of the operating knob 9.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] The rotation member in which it rotated in one with the operating knob by which rotation actuation is carried out, and this operating knob, and the gear section for a drive was formed, The gear member in which the gear section for [driven] which gears in the gear section of this rotation member was formed, In the heater control equipment is equipped with the connection member which connects an air-conditioner side with this gear member, and it was made to drive air-conditioner flank material according to rotation of an operating knob Heater control equipment characterized by having changed the distance from the center of rotation of each gear tooth of said gear section, and changing the transfer ratio to the gear member to rotation of an operating knob.
[Claim 2] Heater control equipment according to claim 1 characterized by having formed so that the gear tooth of the gear section of said rotation member might be turned to one side from a center and the distance from the center of rotation might become large, and forming the gear tooth with which the distance from the center of rotation becomes small at the other side.
[Claim 3] Heater control equipment according to claim 1 characterized by having formed the gear tooth of the gear section of said rotation member so that the distance from the center of rotation might become small about a center section, and forming the gear tooth with which the distance from the center of rotation becomes large at the both-sides section.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] This invention connects the operating knob by which rotation actuation is carried out, and air-conditioner flank material through gear, and relates to the heater control equipment it was made to drive air-conditioner flank material according to rotation of an operating knob.
[0002]
[Description of the Prior Art] Conventionally, there is heater control equipment which was made to carry out switching operation by rotation of the operating knob which prepared the air-conditioner flank material of a car in the dashboard section near the driver's seat through gear.
[0003] As this kind of heater control equipment is shown in JP,55-119514,A While preparing the rotation member which can be freely rotated in the dashboard section and preparing an operating knob in this rotation member at the end by the side of the vehicle interior of a room, a bevel gear is formed in that other end. To this bevel gear, mesh the flabellate form comparatively big bevel gear of the rocking radius rocked by rotation of this, cross the end of the above-mentioned wire cable to the rocking edge of this flabellate form bevel gear throughout that rocking include-angle range in that center section, an abbreviation tangential direction is made to meet, and it is made to connect. Therefore, if an operating knob is rotated, flabellate form bevel gear will rock as compared with the amount of rotation, and the wire cable connected with bevel gear is expanded and contracted.
[0004] In such a thing, near the center, the amount of telescopic motion of the wire cable to the amount of rotation of an operating knob was what becomes small as it separated from the core greatly. An outline is explained about the case where it is used for what is made to carry out opening control and was made to carry out temperature control of the air mix damper which adjusts the amount of mixing of warm air and cold blast for this in proportion to the amount of telescopic motion of a wire cable.
[0005] A thermostat 100 also has the air mix damper (not shown) which adjusts the amount of mixing of the warm air of air-conditioner flank material, and cold blast in a center valve position, when the operating knob 101 for the temperature control of a thermostat 100 is in a center valve position, as shown in drawing 9 and drawing 10 . And if an operating knob 101 is clockwise rotated from this location, since the rotation member 102 attached in the tooth-back side of this operating knob 101 would rotate clockwise in one and the gear section 105 of the gear lever 104 will have geared with the gear section 103 of the rotation member 102, the gear lever 104 is clockwise rotated in drawing 10 . When the gear lever 104 rotates clockwise, the inner wire 108 of the wire cable 107 attached in the wire attaching hole 106 of the gear lever 104 moves to right-hand side, the air mix damper of air-conditioner flank material is driven, cold blast is decreased, and the amount of warm air is made to increase. And when an operating knob 101 is counterclockwise rotated from a center valve position contrary to this, it rotates counterclockwise and the inner wire 108 moves to left-hand side, and the gear lever 104 makes the air mix damper of air-conditioner flank material drive, decreases warm air, and makes the amount of cold blast increase similarly.

[0006] In addition, this thermostat 100 sets the amount of telescopic motion of the inner wire 108 when the gear lever 104 rotates once [alpha] from a center valve position to s1, as shown in drawing 11 (a). If the rotation include angle of alpha 2 and the gear lever 104 required in order only for the inner wires1 to move 108 further is set to alpha 3, the rotation include angle of the gear lever 104 required in order only for the inner wires1 to move 108 furthermore The relation of the rotation include angle of this gear lever 104 is set to alpha1<alpha2<alpha3.
[0007] For this reason, while the gear lever 104 is rotating the rotation include angle of the gear lever 104, and the relation of the amount of telescopic motion of the inner wire 108 near a center, when the gear lever 104 rotates the amount of telescopic motion in the location greatly distant from the center, the amount of telescopic motion becomes small. Therefore, when an operating knob 101 was operated, near the center, the fault that there was little change had occurred to the amount of rotation of an operating knob 101 in the location which a temperature change is intense, and fine tuning becomes impossible, and is distant from near a center. And when making rotation of an operating knob 101 direct to a display board 109, as shown in drawing 9 , spacing of each graduation 110 was made into spacing narrow near a center, and it had to be set as the display of large spacing as it separated from the center.
[0008] Next, the case where it is used for the ventilation mode switching unit 200 is explained. In the condition which shows the ventilation mode switching unit 200 in drawing 9 , it is in a center valve position, and the wind direction of a ventilation mode switching unit has the operating knob 201 for a ventilation mode change-over in the location of FOOT, and it sends a wind underfoot.
[0009] If an operating knob 201 is clockwise rotated from this location, the rotation member 202 will rotate clockwise and the gear section 205 of the gear lever 204 will gear with the gear section 203 of the rotation member 202. In drawing 10 R> 0, rotate the gear lever 204 clockwise, and the damper which changes a wind through the inner wire 208 of the wire cable 207 attached in the wire attaching hole 206 of the gear lever 204 is driven. If wind direction of a ventilation mode switching unit is made into the location of FOOT-DEF, it ventilates towards a step and a windshield and an operating knob 201 is rotated further clockwise The ventilation mode switching unit 200 turns into a location of DEF, stops the ventilation to a step, and ventilates only towards a windshield. And if the ventilation mode switching unit 200 will turn into a location of FOOT-FACE if an operating knob 201 is counterclockwise rotated from a center valve position contrary to this, and it comes to ventilate in a step and the direction of a face and an operating knob 201 is rotated further counterclockwise, it will become the location of FACE, the ventilation to a step will be stopped, and it will ventilate only in the direction of a face.
[0010] In addition, until the gear lever 204 rotates clockwise and makes it the location of FOOT-DEF, as this ventilation mode switching unit 200 is shown in drawing 11 (b) Until alpha4, alpha5, and the gear lever 204 rotate counterclockwise and make a rotation include angle until it makes it DEF from the location of FOOT-DEF which reaches the location of FOOT-FACE If a rotation include angle until it makes it FACE from the location of FOOT-FACE which reaches is set to alpha6 and alpha7, the relation of this rotation include angle is constituted so that it may be set to alpha5<alpha4<alpha6<alpha7.
[0011] Therefore, when an operating knob 201 is operated, it becomes an include angle small in a clockwise rotation side. In the fault that an actuation include angle must be enlarged in a counterclockwise rotation side occurring and making rotation of an operating knob 201 direct to a display board 109 The display 209 for ventilation modes was what it becomes the small display of an actuation include angle from FOOT by the side of a clockwise rotation at the DEF side, and the FACE side serves as a large display of an actuation include angle from FOOT by the side of a counterclockwise rotation, and becomes the distorted display which does not maintain balance, as shown in drawing 9 .
[0012]
[Problem(s) to be Solved by the Invention] This invention is made [making it rotation spacing of an operating knob turn into regular intervals, and] as a technical problem, even if the strokes of the connection member which connects air-conditioner flank material with an operating knob paying attention to this point are not regular intervals.
[0013]

[Means for Solving the Problem] The operating knob by which rotation actuation is carried out in this invention in order to attain the above-mentioned technical problem, The rotation member in which it rotated in one with this operating knob, and the gear section for a drive was formed, The gear member in which the gear section for [driven] which gears in the gear section of this rotation member was formed, In the heater control equipment is equipped with the connection member which connects an air-conditioner side with this gear member, and it was made to drive air-conditioner flank material according to rotation of an operating knob It is considering as the structure where changed the distance from the center of rotation of each gear tooth of said gear section, and the transfer ratio to the gear member to rotation of an operating knob was changed.

[0014] According to this configuration, the purpose can be attained with easy structure only for the structure which made un-circular the gear section which transmits rotation of an operating knob, without making components increase.
[0015] Moreover, it can form so that the gear tooth of the gear section of said rotation member may be turned to one side from a center and the distance from the center of rotation may become large, and the gear tooth with which the distance from the center of rotation becomes small at the other side can be formed. In this case, with the easy structure of preparing the gear divided into right and left, even if a difference is in the rotation include angle of one side of a gear member, and the rotation include angle of the other side, spacing in the mode by the side of an operating knob can be made into outline homogeneity.
[0016] Moreover, if it forms so that the distance from the center of rotation may become small about a center section, and it is made for the distance from the center of rotation to become large at the both-sides section, the gear tooth of the gear section of said rotation member Near a center, even if the amount of telescopic motion of the wire cable to the amount of rotation of a gear member becomes small as it separates from a core greatly, it can amend this and can make outline homogeneity spacing in the mode by the side of an operating knob.
[0017]
[Embodiment of the Invention] Next, the example of this invention is explained according to an accompanying drawing. Drawing 1 and drawing 2 show the heater control equipment of the automobile which applied the 1st example and the 2nd example of this invention. This heater control equipment A display board 1 and the base section 2 are formed in one. In the base section 2, the amount of mixing of warm air and cold blast The air mix damper (not shown) to adjust The thermostat 3 and wind direction which are made to carry out opening control and carry out temperature control It is equipped with the ventilation mode switching unit 4 to switch, the airflow adjustment 5 which adjusts airflow, the inside-and-outside mind switching unit 6 which switches bashful circulation and open air installation, the A/C switch 7 made into air-conditioner mode, and the rear differential-gear switch which is made to energize heat ray of rear window and takes cloudiness 8 grade.
[0018] And switch-knob 7a which turns on and off the operating knob 9 for temperature control which operates a thermostat 3, the operating knob 10 for a ventilation mode change-over which operates the ventilation mode switching unit 4, the operating knob 11 for airflow accommodation which operates the airflow adjustment 5, the operating knob 12 for an inside-and-outside mind change-over which operates the inside-and-outside mind switching unit 6, and the A/C switch 7, and switch-knob 8a which turns on and off the rear differential-gear switch 8 are arranged in the front-face side of a display board 1.
[0019] Moreover, the front-face side of a display board 1 is made into the screen 13, the amount of warm air increases to this screen 13 in the direction of a clockwise rotation around the operating knob 9 for temperature control, and the display 14 for temperature control displayed that the amount of cold blast increases in the direction of a counterclockwise rotation is printed. This display 14 consisted of display 14b for cold blast which is thick at the display 14a [which is thick at the clockwise rotation side / for warm air], and counterclockwise rotation side, these the displays 14a and 14b of both were divided at equal intervals, and that division part has achieved the duty of memory 14c. And if an operating knob 9 is rotated, the guide mark 9a will point out each display.

[0020] The display 15 for ventilation modes is printed around the operating knob 10 for a ventilation mode change-over. This display 15 has display 15c for FOOT which sends a wind in the center underfoot. It has 15d of displays for FOOT-DEF which send a wind to both display 15e for DEF, a step, and the windshield that sends a wind to a clockwise rotation side towards a windshield. It has display 15b for FOOT-FACE which sends a wind to a counterclockwise rotation side towards both display 15a for FACE, a step, and the face that sends a wind towards a face. And these display 15a thru/or 15e are arranged at the outline said spacing, and if an operating knob 10 is rotated, the guide mark 10a will point out each display.
[0021] The display 16 for airflow accommodation is printed around the operating knob 11 for airflow accommodation, and this display 16 has the phase 0 of display 16a and airflow thru/or display 16b of 4 which shows that it is an object for airflow accommodation. And when guide mark 11a of an operating knob 11 has pointed out the location of "0" shown by drawing 1 , airflow is zero, and the maximum airflow is injected, when having pointed out "1" and having pointed out a breeze and "4." Moreover, on the left-hand side of the operating knob 12 for an inside-and-outside mind change-over, display 12b for open air installation is printed by display 12a for bashful circulation, and right-hand side. And when an operating knob 12 is in left-hand side, it becomes bashful circulation, and the open air is introduced when it moves to right-hand side.
[0022] Since there are not the former and a changing place hereafter about the airflow adjustment 5, the inside-and-outside mind switching unit 6, the A/C switch 7, and the rear differential-gear switch 8, explanation is omitted and a thermostat 3 and the ventilation mode switching unit 4 are explained still more concretely.
[0023] A thermostat 3 shows the 1st example of this invention, and this operating knob 9 and the rotation member 30 rotated in one are attached in the tooth-back side of the operating knob 9 for the temperature control of this thermostat 3 on both sides of the plotting board 1. The gear section 31 for a drive is formed in this rotation member 30. The gear section 31 for this drive The tooth parts 32 and 33 of the major diameter constituted each from four gear teeth by both sides as shown in drawing 3 (a), and the tooth part 34 of the minor diameter which consisted of five gear teeth in the center, It is formed between the tooth parts 32 and 33 of a major diameter, and the tooth part 34 of a minor diameter, and consists of a middle tooth part 35 of the left-hand side in drawing which consisted of three gear teeth for which the path changed one by one, and a right-hand side middle tooth part 36.
[0024] As shown in drawing 4 (a) and (b), they are the R sections 35d, 35e, and 35f excised in the shape of an R, respectively at the tooth part 34 side of the minor diameter of the gear teeth 35a, 35b, and 35c of this middle tooth part 35. The gear teeth 36a, 36b, and 36c of the middle tooth part 36 serve as the R sections 36d, 36e, and 36f from which the tooth part 34 side of a minor diameter was excised in the shape of an R similarly.
[0025] Thus, since the distance from the center of rotation is changed and he is trying to form each gear tooth of the gear section 31, two or more gear members from which gear ratio differs are not needed, and components mark do not increase.
[0026] Furthermore, as for the back end section of the rotation member 30, the shank 37 is formed. The shank 37 is inserted in the bearing 22 formed in the cylinder part 21 which protruded on the base section 2.
[0027] And the gear lever 40 is arranged in the backside [the rotation member 30] lower part section (setting to drawing 2 tooth-back side of space). The omission by the side of the upper part (it sets to drawing 2 and is the near side of space) is prevented by the claw part 23 which the gear lever 40 fitted into said cylinder part 21 rotatable, and was formed in the periphery section of a cylinder part 21.
[0028] This gear lever 40 is equipped with the gear section 41 for [driven] which gears with the gear section 31 for the drive of said rotation member 30 as shown in drawing 3 (b). The gear section 41 for / driven [this] The tooth parts 32 and 33 of the major diameter of the gear section 31 for said drive, the gearing tooth parts 42 and 43, the tooth part 34 of a minor diameter, a gearing tooth part 44, middle tooth parts 35 and 36, and gearing tooth parts 45 and 46 are consisted of by both sides.

[0029] As shown in drawing 4 (a) and (b), they are the R sections 45d, 45e, and 45f excised in the shape of an R, respectively at the tooth part 42 side of the gear teeth 45a, 45b, and 45c of this tooth part 45. The gear teeth 46a, 46b, and 46c of a tooth part 46 serve as the R sections 46d, 46e, and 46f from which the tooth part 43 side was excised in the shape of an R similarly.
[0030] In addition, it considers as the rotation radius r1 of the gear teeth 35a and 36a of the tooth parts 32 and 33 of the major diameter of the gear section 31 formed in the rotation member 30, and the middle tooth parts 35 and 36, the rotation radius r2 of gear teeth 35b and 36b, the rotation radius r3 of gear teeth 35c and 36c, and the rotation radius r4 of the tooth part 34 of a minor diameter, and it constitutes so that it may be set to r1>r2>r3>r4. Therefore, when the rotation member 30 rotates at the same include angle, the direction of the include angle which the tooth parts 32 and 33 of a major diameter gear [include angle] with the gear section 41 for [driven], and rotates the gear lever 40 becomes larger than the include angle which the tooth part 34 of a minor diameter gears [include angle] with the gear section 41 for [driven], and rotates the gear lever 40. That is, the include angle which rotates the gear lever 40 in proportion to the magnitude of radii r1, r2, r3, and r4 becomes large.
[0031] Moreover, the overhang section 47 is formed behind the gear lever 40, and the wire attaching hole 48 is formed in this overhang section 47. And opening control of the air mix damper (not shown) with which rotation of the gear lever 40 adjusts the amount of mixing of the warm air of air-conditioner flank material and cold blast through inner wire 49a of the wire cable 49 as a connection member is carried out.
[0032] And the rotation include angle of the gear lever 40 and the relation of the amount of telescopic motion of inner wire 49a The amount of telescopic motion of inner wire 49a when the gear lever 40 rotates once [alpha] from a center valve position is set to s1 like the conventional example shown in drawing 11 (a). If the rotation include angle of alpha 2 and the gear lever 40 required in order only for s1 to move inner wire 49a further is set to alpha 3, the rotation include angle of the gear lever 40 required in order only for s1 to move inner wire 49a furthermore The relation of the rotation include angle of this gear lever 40 is set to alpha1<alpha2<alpha3. In addition, the gear levers 40 of this example differ in that the configuration of the gear section 41 is different to the gear lever 104 of the conventional example.
[0033] The ventilation mode switching unit 4 shows the 2nd example of this invention, and this operating knob 10 and the rotation member 50 rotated in one are attached in the tooth-back side of the operating knob 10 for a ventilation mode change-over of this ventilation mode switching unit 4 on both sides of the plotting board 1. The gear section 51 for a drive is formed in this rotation member 50. The gear section 51 for this drive As shown in drawing 5 (a), it is formed between the tooth part 52 of the major diameter formed in the left-hand side in drawing for nine gear teeth, the tooth part 53 of the minor diameter formed in the drawing Nakamigi side for seven gear teeth, and the tooth part 52 of a major diameter and the tooth part 53 of a minor diameter, and it consists of middle tooth parts 54 which consisted of three gear teeth for which the path changed one by one. The tooth part 53 side of the minor diameter of each gear tooth of this middle tooth part 54 is excised in the shape of an R, respectively.
[0034] Furthermore, as for the back end section of the rotation member 50, the shank 55 is formed. The shank 55 is inserted in the bearing 25 formed in the cylinder part 24 which protruded on the base section 2.
[0035] And the gear lever 60 is arranged in the backside [the rotation member 50] lower part section (setting to drawing 2 tooth-back side of space). The omission by the side of the upper part is prevented by the claw part 26 which the gear lever 60 fitted into said cylinder part 24 rotatable, and was formed in the periphery section of a cylinder part 24.
[0036] driven [which gears with the gear section 51 for the drive of said rotation member 50 on this gear lever 60 as shown in drawing 5 (b)] -- the gear section 61 of business -- having -- driven [this] -- the gear section 61 of business is constituted from the tooth part 52 of the major diameter of the gear section 51 for said drive, the gearing tooth part 62, the tooth part 53 of a minor diameter, a gearing tooth part 63, a middle tooth part 54, and a gearing tooth part 64 by the left-hand side in drawing. The tooth part 62 side of each gear tooth of this tooth part 64

is excised in the shape of an R, respectively.
[0037] In addition, as shown in drawing 5 (a), it considers as the rotation radius r5 of gear-tooth 54a of the tooth part 52 of a major diameter, and the middle tooth part 54, the rotation radius r6 of gear-tooth 54b of the middle tooth part 54, the rotation radius r7 of gear-tooth 54c, and the rotation radius r8 of the tooth part 53 of a minor diameter, and it constitutes so that it may be set to r5>r6>r7>r8. Therefore, when the rotation member 50 rotates at the same include angle, the direction of the include angle which the tooth part 52 of a major diameter gears [include angle] with the gear section 61 for [driven], and rotates the gear lever 60 becomes larger than the include angle which the tooth part 53 of a minor diameter gears [include angle] with the gear section 61 for [driven], and rotates the gear lever 60. That is, the include angle which rotates the gear lever 60 in proportion to the magnitude of radii r5, r6, r7, and r8 becomes large.
[0038] Moreover, the overhang section 65 is formed behind the gear lever 60, and the wire attaching hole 66 is formed in this overhang section 65. And the drive of a damper whose rotation of the gear lever 60 changes a wind through inner wire 67a of the wire cable 67 is controlled.
[0039] And the relation between the rotation include angle of the gear lever 60, and the damper which changes a wind Until the gear lever 60 rotates clockwise and makes it the location of FOOT-DEF like the conventional example shown in drawing 11 (b) Until alpha4, alpha5, and the gear lever 60 rotate counterclockwise and make a rotation include angle until it makes it DEF from the location of FOOT-DEF which reaches the location of FOOT-FACE If a rotation include angle until it makes it FACE from the location of FOOT-FACE which reaches is set to alpha6 and alpha7, the relation of this rotation include angle is alpha5<alpha4<alpha6<alpha7. In addition, the gear levers 60 of this example differ in that the configuration of the gear section 61 is different to the gear lever 204 of the conventional example.
[0040] Next, actuation of a thermostat 3 and the ventilation mode switching unit 4 is explained. In a thermostat 3, in the condition which shows in drawing 1 , the operating knob 9 for temperature control is in a center valve position, and the air mix damper which adjusts the amount of mixing of the warm air of air-conditioner flank material and cold blast also has it in a center valve position. And in this location, the tooth part 34 of the minor diameter of the rotation member 30 has geared with the tooth part 44 of the gear section 41 for [driven].
[0041] If an operating knob 9 is clockwise rotated from this location, since it would rotate clockwise in [the rotation member 30] one and the tooth part 44 of the gear lever 40 will have geared with the tooth part 34 of the minor diameter of the rotation member 30, the gear lever 40 is clockwise rotated in drawing 2 . At this time, the rotation include angle of the gear lever 40 to the rotation include angle of the rotation member 30 is rotated at a small rate. And if an operating knob 9 is rotated to a predetermined include angle (1/3 of the outline maximum include angle), engagement with a tooth part 44 separates from the tooth part 34 of a minor diameter, and it will be in the condition that the middle tooth part 36 next geared with the tooth part 46. And only an include angle alpha 1 is rotated clockwise, and only distance s1 operates inner wire 49a attached in the wire attaching hole 48 of the gear lever 40 in the shrinkage direction, and the gear lever 40 drives the air mix damper of air-conditioner flank material, decreases cold blast, and makes the amount of warm air increase.
[0042] And if an operating knob 9 is rotated further clockwise, a middle tooth part 36 and a middle tooth part 46 will gear, and the gear lever 40 will be rotated further clockwise. At this time, while the rate of the rotation include angle of the gear lever 40 to the rotation include angle of the rotation member 30 increases, the gear lever 40 rotates. And if an operating knob 9 is rotated to a predetermined include angle (2/3 of the outline maximum include angle), engagement with a tooth part 46 separates from the middle tooth part 36, and it will be in the condition that the tooth part 33 of a major diameter next geared with the tooth part 43. And the gear lever 40 rotates only an include angle alpha 2 clockwise, and only distance s1 operates in the shrinkage direction further, and inner wire 49a drives the air mix damper of air-conditioner flank material, decreases cold blast further, and makes the amount of warm air increase.
[0043] At this time, gear-tooth 46c of a tooth part 46 gears with gear-tooth 36c of the middle tooth part 36 first in a detail, next gear-tooth 46b gears with gear-tooth 36b, and gear-tooth 46a

gears with gear-tooth 36a to a pan, and engagement of each gear tooth is canceled one by one after engagement. However, although engagement cost becomes large and it becomes the configuration that gear-tooth 36c cannot escape from a tooth part 46 easily since the gear-tooth 46c is prepared in the location projected by the rotation member 30 side rather than gear-tooth 46b in the tooth part 46 Gear-tooth 36c interferes with gear-tooth 46c, and seems not to bar rotation of the rotation member 30, in case gear-tooth 36c slips out of a tooth part 46 since 36f of R sections is formed also in gear-tooth 36c and he is trying for engagement cost to become small, while forming 46f of R sections in gear-tooth 46c. Furthermore, since the R sections 36d, 36e, 46d, and 46e are formed also like the gear teeth 36a and 36b of the middle tooth part 36, and the gear teeth 46a and 46b of a tooth part 46, rotation actuation of the rotation member 30 can be performed smoothly. In addition, engagement cost can be made small more now by preparing the R section in both gear-tooth 36c and gear-tooth 46c.

[0044] Furthermore, if an operating knob 9 is rotated clockwise, the tooth part 33 and tooth part 43 of a major diameter will gear, and the gear lever 40 will be rotated further clockwise. At this time, the rotation include angle of the gear lever 40 to the rotation include angle of the rotation member 30 is rotated at a large rate. And if an operating knob 9 is rotated to the maximum include angle, the gear lever 40 will rotate only an include angle alpha 3 clockwise, and inner wire 49a makes only warm air the air mix damper of air-conditioner flank material by only distance s1 operating in the shrinkage direction further, and it is set to an elevated temperature.

[0045] If an operating knob 9 is counterclockwise rotated from a center valve position contrary to this, the gear lever 40 will be similarly rotated counterclockwise in drawing 2 . Also at this time, the rotation include angle of the gear lever 40 to the rotation include angle of the rotation member 30 is rotated at a small rate. And if it rotates to a predetermined include angle (1/3 of the outline maximum include angle), engagement with a tooth part 44 will separate from the tooth part 34 of a minor diameter. Then, the middle tooth part 35 gears with a tooth part 45, and only an include angle alpha 1 is rotated counterclockwise, only distance s1 operates inner wire 49a in the direction of elongation, and the gear lever 40 drives the air mix damper of air-conditioner flank material, decreases warm air, and makes the amount of cold blast increase.

[0046] And if an operating knob 9 is rotated further counterclockwise, a middle tooth part 35 and a middle tooth part 45 will gear, and the gear lever 40 will be rotated further counterclockwise. Also at this time, while the rate of the rotation include angle of the gear lever 40 to the rotation include angle of the rotation member 30 increases, the gear lever 40 rotates. And if it rotates to a predetermined include angle (2/3 of the outline maximum include angle), engagement with a tooth part 45 separates from the middle tooth part 35, and it will be in the condition that the tooth part 32 of a major diameter next geared with the tooth part 42. And the gear lever 40 rotates only an include angle alpha 2 counterclockwise, and only distance s1 operates in the direction of elongation further, and inner wire 49a drives the air mix damper of air-conditioner flank material, decreases warm air further, and makes the amount of cold blast increase.

[0047] At this time, gear-tooth 45c of a tooth part 45 gears with gear-tooth 35c of the middle tooth part 35 first in a detail, next gear-tooth 45b gears with gear-tooth 35b, and gear-tooth 45a gears with gear-tooth 35a to a pan, and engagement of each gear tooth is canceled one by one after engagement. And since the R sections 35d, 35e, and 35f and the R sections 45d, 45e, and 45f are formed in each gear tooth of this middle tooth part 35 and a tooth part 45, rotation actuation of the rotation member 30 can be smoothly performed like the time of engagement with said middle tooth part 36 and tooth part 46, without a middle tooth part 35 and a middle tooth part 45 interfering.

[0048] And if an operating knob 9 is rotated further counterclockwise, the gear lever 40 will be rotated further counterclockwise. Also at this time, the rotation include angle of the gear lever 40 to the rotation include angle of the rotation member 30 is rotated at a large rate. And if an operating knob 9 is rotated to the maximum include angle, the gear lever 40 will rotate only an include angle alpha 3 counterclockwise, and inner wire 49a makes only cold blast the air mix damper of air-conditioner flank material by only distance s1 operating in the direction of elongation further, and it is set to low temperature.

[0049] The rotation include angle of the gear lever 40 to the rotation include angle of the

rotation member 30 increases gradually, and, at the end, the rotation include angle of the gear lever [as opposed to / when a predetermined include angle, a clockwise rotation, or a counterclockwise rotation is made to rotate an operating knob 9 from a center valve position as described above / the rotation include angle of the rotation member 30] 40 is rotated at a large rate, when it rotates at a small rate and is made to rotate exceeding a predetermined include angle. Therefore, since an operating knob 9 can change the rotation include angle of the fixed gear lever 40 when carrying out include-angle rotation actuation, in proportion to the rotation include angle of the operating knob 9 for temperature control, the contraction amount of inner wire 49a can be changed.

[0050] On the other hand, in the ventilation mode switching unit 4, in the condition which shows in drawing 1 R> 1, it is in a center valve position, and the ventilation mode switching unit 4 has the operating knob 10 for a ventilation mode change-over in the location of FOOT, and it sends a wind underfoot. And in this location, as shown in drawing 5 (b), the middle tooth part 54 of the rotation member 50 has geared with the tooth part 64 of the gear section 61 for [driven].

[0051] therefore — if an operating knob 10 is clockwise rotated from this location — the rotation member 50 — a clockwise rotation — rotating — the middle tooth part 54 of the rotation member 50, and driven — after the tooth part 64 of the gear section 61 of business gears, the tooth part 53 and tooth part 63 of a minor diameter gear succeedingly, in drawing 2 , it rotates clockwise and the gear lever 60 drives the damper which changes a wind through inner wire 67a of the wire cable 67. At this time, the rotation include angle of the gear lever 60 to the rotation include angle of the rotation member 50 decreases gradually, and the tooth part 53 of a minor diameter and the gear section 61 for [driven] rotate it at a small rate by the condition of gearing and rotating. And if an operating knob 10 is rotated to the location of 15d of displays for FOOT-DEF, the gear lever 60 rotates only an include angle alpha 4, inner wire 67a is operated, and the damper which changes a wind will serve as a location of FOOT-DEF, and will ventilate towards a step and a windshield. Furthermore, the damper which it is the rate that the gear lever 60 is small when an operating knob 10 is clockwise rotated to the location of display 15for DEF e, and it rotates clockwise further, the gear lever 60 rotates only an include angle alpha 5 further, and inner wire 67a is operated, and changes a wind serves as a location of DEF, the ventilation to a step is stopped, and it ventilates only towards a windshield.

[0052] if an operating knob 10 is counterclockwise rotated from a center valve position contrary to this — the middle tooth part 54 of the rotation member 50, and driven — after the tooth part 64 of the gear section 61 of business gears, the tooth part 52 and tooth part 62 of a major diameter gear succeedingly, and the gear lever 60 is counterclockwise rotated in drawing 2 . At this time, the rotation include angle of the gear lever 60 to the rotation include angle of the rotation member 50 increases gradually, and is rotated at a large rate by the condition of the tooth part 52 and tooth part 62 of a major diameter gearing, and rotating. And if an operating knob 10 is rotated to the location of display 15b for FOOT-FACE, the gear lever 60 rotates only an include angle alpha 6, inner wire 67a is operated, and the damper which changes a wind will serve as a location of FOOT-FACE, and will ventilate in a step and the direction of a face. Furthermore, if an operating knob 10 is counterclockwise rotated to the location of display 15a for FACE, the gear lever 60 rotates only an include angle alpha 7 at a rate in the size case, and operates inner wire 67a, and the damper which changes a wind will serve as a location of FACE, will stop the ventilation to a step, and will ventilate only in the direction of a face.

[0053] When a clockwise rotation is made to rotate an operating knob 10 from a center valve position as described above, the rotation include angle of the gear lever 60 to the rotation include angle of the rotation member 50 decreases gradually, and, at the end, the gear lever 60 is rotated at a small rate. On the other hand, when a counterclockwise rotation is made to rotate an operating knob 10 from a center valve position, the rotation include angle of the gear lever 60 to the rotation include angle of the rotation member 50 increases gradually, and, at the end, rotates the gear lever 60 at a large rate. Therefore, an operating knob 10 can change now the rotation include angle of the fixed gear lever 60 when carrying out include-angle rotation actuation.

[0054] Next, the modification of a rotation member and a gear lever is hereafter explained

according to a drawing. In addition, since each part material, such as the operating knobs 9 and 10 prepared in the display panel 1 shown in drawing 1 R> 1, displays 14 and 15, and a switch, is the same as that of said 1st and 2nd example, the explanation is omitted.

[0055] Drawing 6 shows the heater control equipment of the automobile which applied the 3rd example of this invention, a thermostat 70 is formed in the rear-face side of the operating knob 9 for the temperature control of this heater control equipment, and the ventilation mode switching unit 71 is formed in the rear-face side of the operating knob 10 for a ventilation mode change-over.

[0056] The ventilation mode switching unit 71 shows the 3rd example of this invention, and an operating knob 10 and the rotation member 72 rotated in one sandwich a display board 1, and it is attached in axial insertion hole 2a prepared in the base section 2 free [rotation] at this ventilation mode switching unit 71. The gear section 73 for a drive is formed in the back end section of this rotation member 72. The gear section 73 for this drive As shown in drawing 8 , it consists of the tooth part 74 of the minor diameter formed for three gear teeth in order of the counterclockwise rotation from the left-hand side in drawing, a middle tooth part 75 formed for eight gear teeth for which the path changed one by one, a tooth part 76 of the major diameter formed for three gear teeth, and a tooth part 77 of the termination formed for four gear teeth for which the path changed one by one.

[0057] And the gear lever 80 is arranged in the backside [the rotation member 72] (it sets to drawing 6 and is the near side of space). The gear lever 80 fits into the cylinder part 78 which protruded on the shaft orientations of the rotation member 72 at the base section 2 rotatable, and the omission by the side of back is prevented by the claw part 79 formed in the periphery section of a cylinder part 78.

[0058] Near the rotation shaft of this gear lever 80, the level difference section 81 projected to the rotation member 72 side is formed, and the gear section 82 for [driven] which gears with the gear section 73 for the drive of the rotation member 72 is formed in the peripheral face of that level difference section 81. The gear section 82 for [driven / this] consists of tooth parts 86 which gear with the tooth part 74 of the minor diameter of the gear section 73 for said drive, the gearing tooth part 83, the middle tooth part 75 and the gearing tooth part 84, the tooth part 76 of a major diameter and the gearing tooth part 85, and the tooth part 77 of termination in the order of a clockwise rotation from the left-hand side in drawing 8 .

[0059] In addition, it considers as the rotation radius r9 of the tooth part 76 of the major diameter of the gear section 73 formed in the rotation member 72, and the rotation radius r10 of the tooth part 74 of a minor diameter, and it constitutes so that it may be set to r9>r10. Moreover, the rotation radius of each gear tooth of the middle tooth part 75 is smaller than r9, and it is constituted so that a rotation radius may become large one by one toward the tooth part 76 side of a major diameter in order from the gear tooth by the side of the tooth part 74 of a minor diameter within larger limits than r10. Furthermore, the rotation radius of each gear tooth of the tooth part 77 of termination consists of gear teeth by the side of the tooth part 76 of a major diameter so that a rotation radius may become small one by one at order, and the reduction ratio for every gear tooth of the rotation radius is constituted so that it may become equivalent to the increment ratio of the rotation radius of the middle tooth part 75.

[0060] Moreover, the overhang section 87 is formed in the periphery of the gear lever 80, and the wire attaching hole 88 is formed in this overhang section 87. And the drive of a damper whose rotation of the gear lever 80 changes a wind through inner wire 91a of the wire cable 91 is controlled.

[0061] In addition, if the damper which will change a wind if the damper which changes a wind serves as a location of FOOT and only an include angle alpha 8 is clockwise rotated from a center valve position when the gear lever 80 is in the neutral location shown in drawing 7 in this example serves as a location of FOOT-FACE and only an include angle alpha 9 is rotated further clockwise, the damper which changes a wind will serve as a location of FOOT. Moreover, if the damper which will change a wind if only an include angle alpha 10 is counterclockwise rotated from a center valve position serves as a location of FOOT-DEF and only an include angle alpha 11 is rotated further clockwise, the damper which changes a wind is constituted so that it may

become the location of DEF. And the relation of the rotation include angle is the relation between alpha9<alpha8<alpha10 and alpha10=alpha11.

[0062] Next, actuation of the ventilation mode switching unit 71 is explained. In the ventilation mode switching unit 71, in the condition which shows in drawing 7 , it is in a center valve position, and the ventilation mode switching unit 71 has the operating knob 10 for a ventilation mode change-over in the location of FOOT, and it sends a wind underfoot. And in this location, as shown in drawing 8 , the middle tooth part 75 of the rotation member 72 has geared with the tooth part 84 of the gear section 82 for [driven].

[0063] therefore — if an operating knob 10 is clockwise rotated from this location — the rotation member 72 — a clockwise rotation — rotating — the middle tooth part 75 of the rotation member 72, and driven — after the tooth part 84 of the gear section 82 of business gears, the tooth part 76 and tooth part 85 of a major diameter gear succeedingly, in drawing 7 , it rotates counterclockwise and the gear lever 80 drives the damper which changes a wind through inner wire 91a of the wire cable 91. At this time, the rotation include angle of the gear lever 80 to the rotation include angle of the rotation member 72 increases gradually, and is rotated at a large rate by the condition of the tooth part 76 and tooth part 85 of a major diameter gearing, and rotating. And if an operating knob 10 is rotated to the location of 15d of displays for FOOT-DEF, the gear lever 80 rotates only an include angle alpha 10, inner wire 91a is operated, and the damper which changes a wind will serve as a location of FOOT-DEF, and will ventilate towards a step and a windshield.

[0064] Furthermore, if an operating knob 10 is clockwise rotated to the location of display 15e for DEF, the tooth part 77 and tooth part 86 of termination will gear, and the gear lever 80 will be counterclockwise rotated in drawing 7 . At this time, the rotation include angle of the gear lever 80 to the rotation include angle of the rotation member 72 decreases gradually, and the gear lever 80 rotates only an include angle alpha 11, inner wire 91a is operated, and the damper which changes a wind serves as a location of DEF, stops the ventilation to a step, and ventilates only towards a windshield.

[0065] if an operating knob 10 is counterclockwise rotated from a center valve position contrary to this — the middle tooth part 75 of the rotation member 72, and driven — after the tooth part 84 of the gear section 82 of business gears, the tooth part 74 and tooth part 83 of a minor diameter gear succeedingly, and the gear lever 80 is clockwise rotated in drawing 7 . At this time, the rotation include angle of the gear lever 80 to the rotation include angle of the rotation member 72 decreases gradually, and is rotated at a small rate by the condition of the tooth part 74 and tooth part 83 of a minor diameter gearing, and rotating. If it rotates to the location of display 15b for FOOT-FACE in that case, the gear lever 80 rotates only an include angle alpha 8, inner wire 91a is operated, and the damper which changes a wind will serve as a location of FOOT-FACE, and will ventilate in a step and the direction of a face. Furthermore, the damper which it is the rate that the gear lever 80 is small when an operating knob 10 is counterclockwise rotated to the location of display 15for FACE a, and it rotates clockwise further, the gear lever 80 rotates only an include angle alpha 9 further, and inner wire 91a is operated, and changes a wind serves as a location of FACE, the ventilation to a step is stopped, and it comes to ventilate only in the direction of a face.

[0066] Therefore, even if it changes the number of sheets of the distance from the center of rotation of each gear tooth of the gear section, or a gear tooth suitably according to the condition of the rotation include angle of the gear lever for which it asks so that clearly from each above-mentioned example, the same effectiveness as the gestalt of operation of this invention can be acquired.

[0067]

[Effect of the Invention] As explained above, according to the heater control equipment of this invention In the heater control equipment which transmits rotation of an operating knob to a connection member through gear, and drives air-conditioner flank material Since the distance from the center of rotation of each gear tooth of the gear section for connection is changed and he is trying to change a transfer ratio according to the rotation location of an operating knob, the rotation range of an operating knob can be made into homogeneity with easy structure, without

making components mark increase.
[0068] Moreover, [0069] which can make homogeneity spacing in the mode by the side of an operating knob with the easy structure of preparing the gear from which the distance from the center of rotation is different in right and left even if a difference is in the rotation include angle of one side of a gear lever, and the rotation include angle of the other side Furthermore, **** to which form the gear tooth of the gear section of a rotation member so that the distance from the center of rotation may become small about a center section, and it is made for the distance from the center of rotation to become large at the both-sides section, Near a center, even if the amount of telescopic motion of the connection member to the amount of rotation of a gear member becomes small as it separates from a core greatly, it can amend this and can make homogeneity spacing in the mode by the side of an operating knob.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the front view of the heater control equipment of this invention.
[Drawing 2] It is the top view of drawing 1 .
[Drawing 3] the rotation member and gear lever of the 1st example were shown, (a) showed the gear section of a rotation member and (b) showed the relation between a rotation member and a gear lever — it is a cross-section side elevation a part.
[Drawing 4] It is the enlarged drawing in which the gear section of the rotation member of the 1st example is shown, (a) shows a left-hand side middle tooth part, and (b) shows the condition of engagement of a right-hand side middle tooth part.
[Drawing 5] the rotation member and gear lever of the 2nd example were shown, (a) showed the gear section of a rotation member and (b) showed the relation between a rotation member and a gear lever — it is a cross-section side elevation a part.
[Drawing 6] It is the rear view of the heater control equipment of the 3rd example.
[Drawing 7] It is drawing which looked at the rotation range of the gear lever of the 3rd example from the operating-knob side.
[Drawing 8] It is the enlarged drawing of drawing 7 and is drawing having shown the relation of engagement of the gear section.
[Drawing 9] It is the front view of the heater control equipment of an example conventionally.
[Drawing 10] It is the top view of drawing 9 .
[Drawing 11] Drawing in which (a) showed the rotation range of the gear lever of the thermostat of an example and the relation of the amount of telescopic motion of a connection member conventionally, and (b) are drawings having shown the rotation range of the gear lever of the ventilation mode switching unit of an example conventionally.
[Description of Notations]
3 Thermostat
4 71 Ventilation mode switching unit
9 Ten Operating knob
30, 50, 72 Rotation member
31, 51, 73 Gear section
40, 60, 80 Gear member (gear lever)
41, 61, 82 The gear section for [driven]
49, 67, 91 Connection member (wire cable)

[Translation done.]

* NOTICES *

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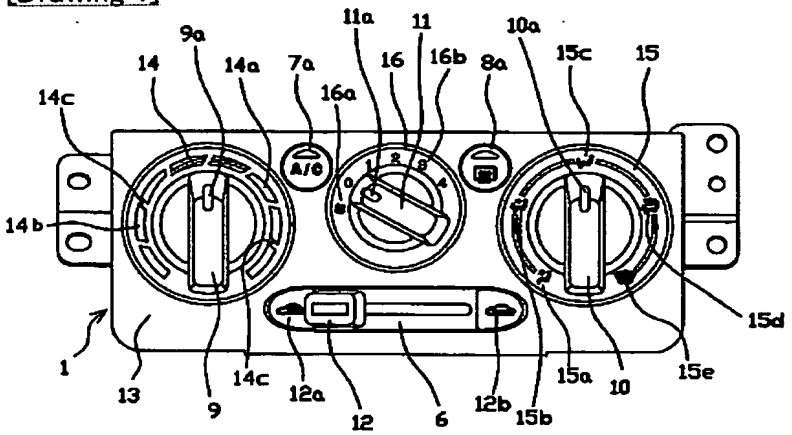
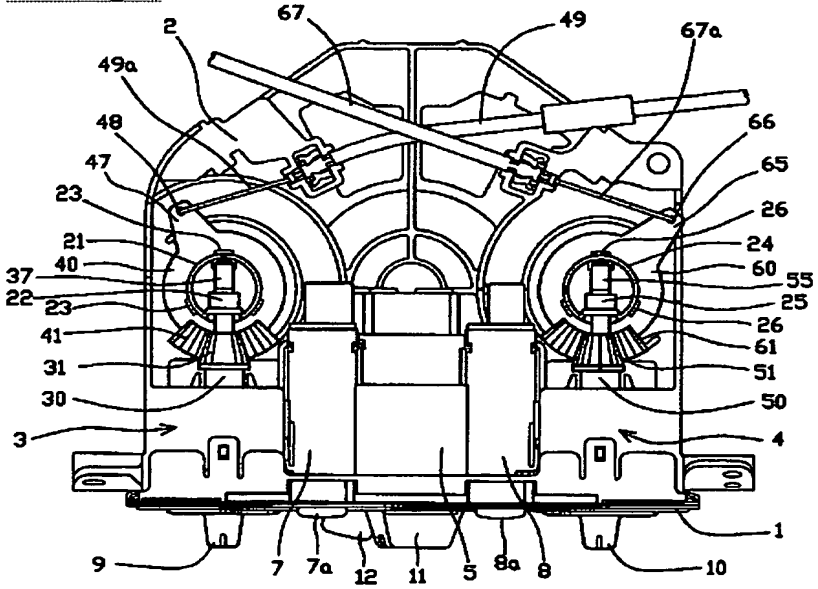
DRAWINGS

[Drawing 1]

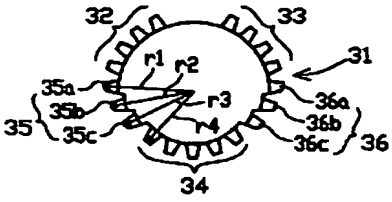


[Drawing 2]



[Drawing 3]

(a)



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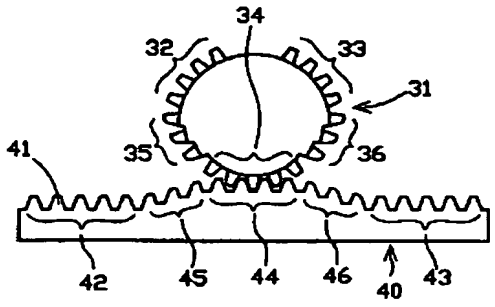
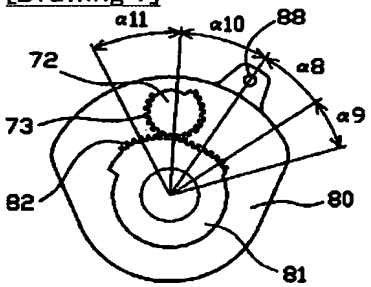
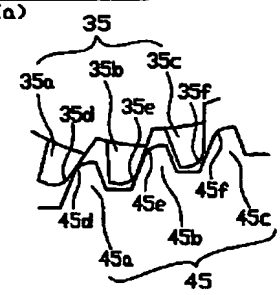


[Drawing 7]



[Drawing 4]

(a)



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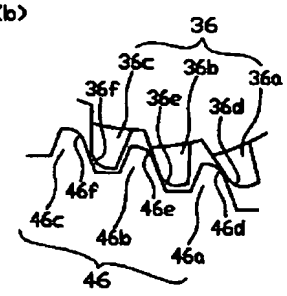
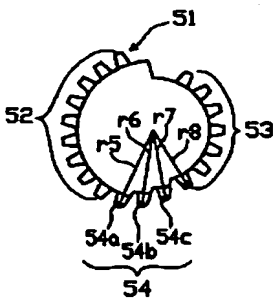


[Drawing 5]

(a)



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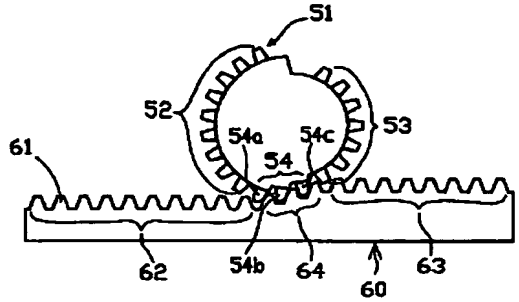
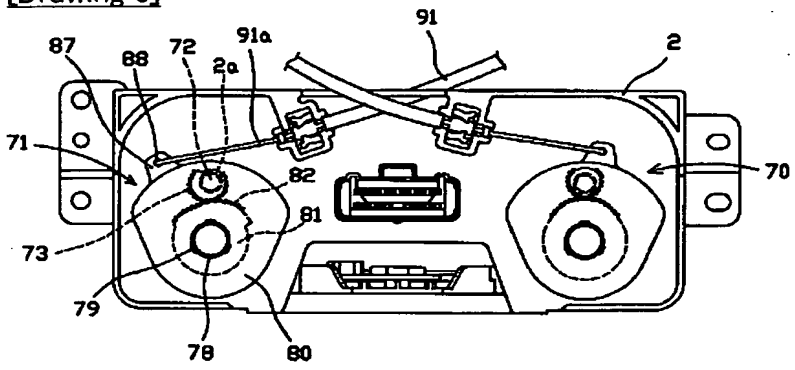
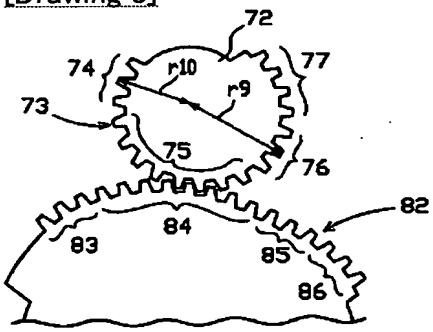


[Drawing 6]



[Drawing 8]



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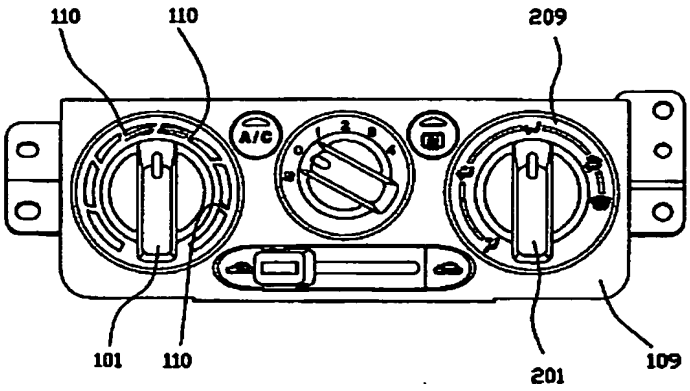
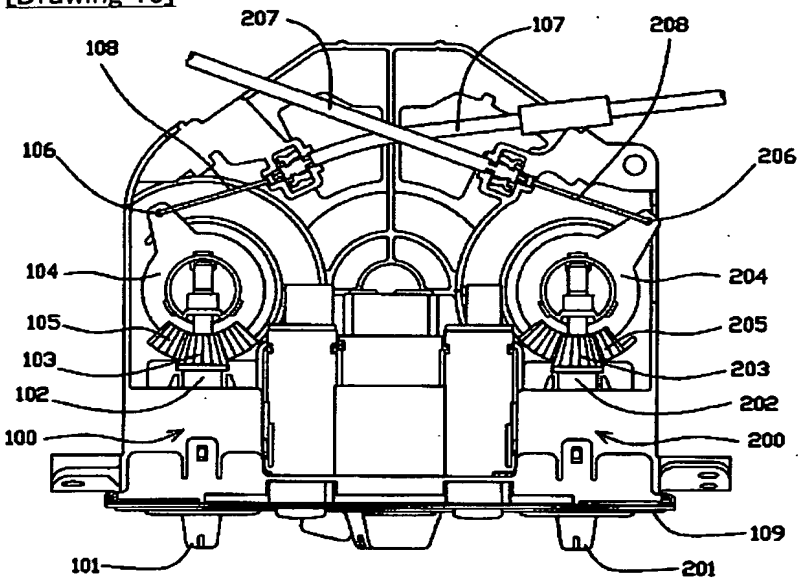
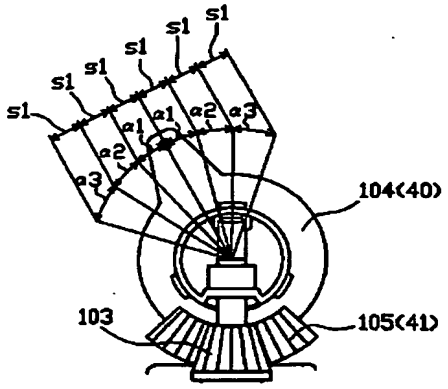


[Drawing 10]

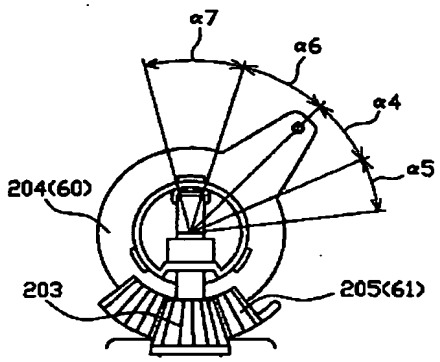


[Drawing 11]

(a)



(b)



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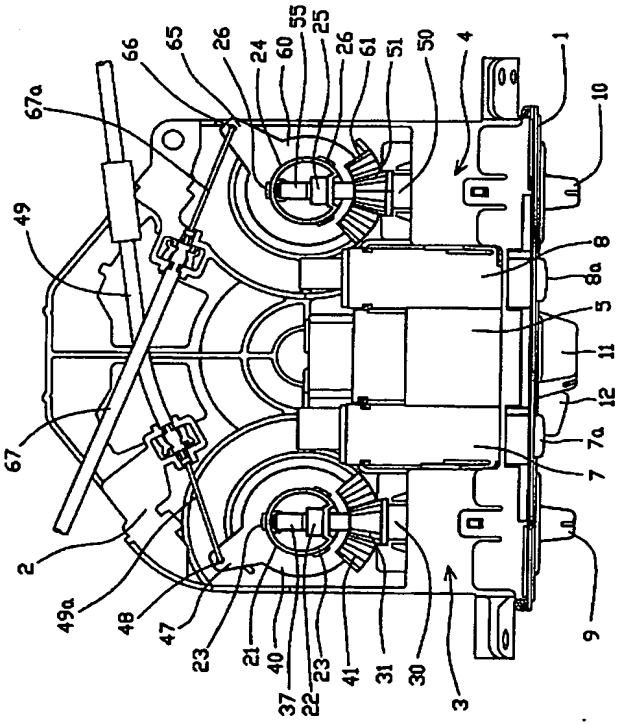
(54)【発明の名称】　ヒーターコントロール装置

(57)【要約】
【課題】操作ノブと空調装置側部材を連結する連結部材のストロークが等間隔でなくても、操作ノブの回動間隔が等間隔となるようにしたヒーターコントロール装置を提供する。
【解決手段】　回動操作される操作ノブ９と、該操作ノブ９と一体的に回動し駆動用のギヤー部３１が形成された回動部材３０と、該回動部材３０のギヤー部３１に噛合する被駆動用のギヤー部４１が形成されたギヤー部材４０と、該ギヤー部材４０と空調装置側を連結する連結部材４９とを備え、操作ノブ９の回動に応じて空調装置側部材を駆動するようにしたヒーターコントロール装置において、前記ギヤー部３１の個々の歯の回転中心からの距離を変化させ、操作ノブ９の回動に対する、ギヤー部材４０への伝達比を変化させた。



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【特許請求の範囲】

【請求項１】　回動操作される操作ノブと、該操作ノブと一体的に回動し駆動用のギヤー部が形成された回動部材と、該回動部材のギヤー部に噛合する被駆動用のギヤー部が形成されたギヤー部材と、該ギヤー部材と空調装置側を連結する連結部材とを備え、操作ノブの回動に応じて空調装置側部材を駆動するようにしたヒーターコントロール装置において、前記ギヤー部の個々の歯の回転中心からの距離を変化させ、操作ノブの回動に対する、ギヤー部材への伝達比を変化させたことを特徴とするヒーターコントロール装置。

【請求項２】　前記回動部材のギヤー部の歯を中央から一方側に向けて回転中心からの距離が大きくなるように形成し、他方側に回転中心からの距離が小さくなる歯を形成したことを特徴とする請求項１に記載のヒーターコントロール装置。

【請求項３】　前記回動部材のギヤー部の歯を中央部を回転中心からの距離が小さくなるように形成し、両側部に回転中心からの距離が大きくなる歯を形成したことを特徴とする請求項１に記載のヒーターコントロール装置。

【発明の詳細な説明】

【０００１】

【発明が属する技術分野】本発明は、回動操作される操作ノブと、空調装置側部材とをギヤーを介して連結し、操作ノブの回動に応じて空調装置側部材を駆動するようにしたヒーターコントロール装置に関する。

【０００２】

【従来の技術】従来、車両の空調装置側部材をギヤーを介して運転席近傍のダッシュボード部に設けた操作ノブの回動により開閉操作するようにしたヒーターコントロール装置がある。

【０００３】この種のヒーターコントロール装置は、例えば、特開昭５５－１１９５１４号公報に示すように、ダッシュボード部に回動自在な回動部材を設け、この回動部材には車室内側の一端に操作ノブを設けるとともにその他端にはかさ歯車を設け、このかさ歯車にはこれの回動によって揺動される揺動半径の比較的大きな扇状のかさ歯車を噛合させ、この扇状のかさ歯車の揺動端にはその中央部に上記ワイヤーケーブルの一端をその揺動角度範囲の全域に渡って略接線方向に沿わせて連結させるようになっている。従って、操作ノブを回動させるとその回動量に比較して扇状の傘歯車が揺動し、傘歯車に連結されているワイヤーケーブルが伸縮されるようになっている。

【０００４】このようなものにおいては、操作ノブの回動量に対するワイヤーケーブルの伸縮量は、中央付近では大きく中心から離れるにしたがって小さくなるものであった。これを、ワイヤーケーブルの伸縮量に比例して温風と冷風との混合量を調節するエアミックスダンパーを開度制御させて温度調節するようにしたものに使用した場合について概略を説明する。

2

【０００５】温度調節装置１００は、図９及び図１０に示すように、温度調節装置１００の温度調節用の操作ノブ１０１が、中立位置にあるときには、空調装置側部材の温風と冷風との混合量を調節するエアミックスダンパー（図示せず）も中立位置にある。そして、この位置から操作ノブ１０１を時計回りに回動させると、該操作ノブ１０１の背面側に取り付けられている回動部材１０２が一体的に時計回りに回動し、回動部材１０２のギヤー部１０３とギヤーレバー１０４のギヤー部１０５が噛合しているため、ギヤーレバー１０４は図１０において時計回りに回動する。ギヤーレバー１０４が時計回りに回動すると、ギヤーレバー１０４のワイヤー取付穴１０６に取り付けられたワイヤーケーブル１０７のインナワイヤ１０８が右側に移動し、空調装置側部材のエアミックスダンパーを駆動して冷風を減少させ、温風の量を増加させる。そして、これとは反対に中立位置から操作ノブ１０１を反時計回りに回動させると、同様にギヤーレバー１０４は反時計回りに回動し、インナワイヤ１０８が左側に移動して、空調装置側部材のエアミックスダンパーを駆動させて温風を減少させ、冷風の量を増加させるようになっている。

【０００６】なお、この温度調節装置１００は、図１１（ａ）に示すように、ギヤーレバー１０４が中立位置からα１度回動したときのインナワイヤ１０８の伸縮量をｓ１とし、さらにインナワイヤ１０８をｓ１だけ移動させるために必要なギヤーレバー１０４の回動角度をα２、さらにインナワイヤ１０８をｓ１だけ移動させるために必要なギヤーレバー１０４の回動角度をα３とすると、このギヤーレバー１０４の回動角度の関係は、α１＜α２＜α３となる。

【０００７】このため、ギヤーレバー１０４の回動角度とインナワイヤ１０８の伸縮量の関係は、ギヤーレバー１０４が中央付近で回動している時は伸縮量は大きく中央から離れた位置でギヤーレバー１０４が回動する場合には伸縮量は小さくなるものである。従って、操作ノブ１０１を操作した場合、中央付近では温度変化が激しく微調整ができなくなり、中央付近から離れた位置では、操作ノブ１０１の回動量に対して変化が少ないという不具合が発生していた。そして、表示板１０９に操作ノブ１０１の回動を指示させる場合には、図９に示すように各目盛り１１０の間隔を中央付近では狭い間隔にし、中央から離れるに従って広い間隔の表示に設定しなければならなかった。

【０００８】次に、送風モード切換装置２００に使用した場合について説明する。送風モード切換装置２００は、図９に示す状態では送風モード切換用の操作ノブ２０１が中立位置にあり、送風モード切換装置の風向はＦＯＯＴの位置にあり足元に風を送るようになっている。

【０００９】この位置から操作ノブ２０１を時計回りに回動させると、回動部材２０２が時計回りに回動し、回動部材２０２のギヤー部２０３とギヤーレバー２０４のギヤー部２０５が噛合して、ギヤーレバー２０４は図１０において時計回りに回動し、ギヤーレバー２０４のワイヤー取付穴２０６に取り付けられたワイヤーケーブル２０７のインナワイヤ２０８を介して風向きを変えるダンパーを駆動し、送風モード切換装置の風向をＦＯＯＴ－ＤＥＦの位置にして、足元とフロントガラスに向けて送風し、更に操作ノブ２０１を時計回りに回動させると、送風モード切換装置２００はＤＥＦの位置となり、足元への送風を止めてフロントガラスにのみ向けて送風するようになっている。そして、これとは反対に中立位置から操作ノブ２０１を反時計回りに回動させると、送風モード切換装置２００はＦＯＯＴ－ＦＡＣＥの位置となり、足元と顔方向に送風するようになり、更に操作ノブ２０１を反時計回りに回動させると、ＦＡＣＥの位置となり、足元への送風を止めて顔方向にのみ送風するようになっている。

【００１０】なお、この送風モード切換装置２００は、図１１（ｂ）に示すように、ギヤーレバー２０４が時計回りに回動してＦＯＯＴ－ＤＥＦの位置にするまで、およびのＦＯＯＴ－ＤＥＦの位置からＤＥＦにするまでの回動角度をα４、α５、ギヤーレバー２０４が反時計回りに回動してＦＯＯＴ－ＦＡＣＥの位置にするまで、およびのＦＯＯＴ－ＦＡＣＥの位置からＦＡＣＥにするまでの回動角度をα６、α７とすると、この回動角度の関係は、α５＜α４＜α６＜α７となるように構成されている。

【００１１】従って、操作ノブ２０１を操作した場合、時計回り側では小さい角度となり、反時計回り側では操作角度を大きくしなければならないという不具合が発生し、表示板１０９に操作ノブ２０１の回動を指示させる場合には、送風モード用の表示部２０９は図９に示すように、時計回り側のＦＯＯＴからＤＥＦ側には操作角度の小さい表示となり、反時計回り側のＦＯＯＴからＦＡＣＥ側は操作角度の大きい表示となり、バランスの取れない歪な表示部になってしまうものであった。

【００１２】

【発明が解決しようとする課題】この発明は、この点に着目し、操作ノブと空調装置側部材を連結する連結部材のストロークが等間隔でなくても、操作ノブの回動間隔が等間隔となるようにすることを課題としてなされたものである。

【００１３】

【課題を解決するための手段】上記の課題を達成するために、本発明では、回動操作される操作ノブと、該操作ノブと一体的に回動し駆動用のギヤー部が形成された回動部材と、該回動部材のギヤー部に噛合する被駆動用のギヤー部が形成されたギヤー部材と、該ギヤー部材と空調装置側を連結する連結部材とを備え、操作ノブの回動に応じて空調装置側部材を駆動するようにしたヒーターコントロール装置において、前記ギヤー部の個々の歯の回転中心からの距離を変化させ、操作ノブの回動に対する、ギヤー部材への伝達比を変化させた構造としている。

【００１４】この構成によれば、操作ノブの回動を伝達するギヤー部を非円形としただけの構造のため、部品を増加させることなく簡単な構造で目的を達成することができる。

【００１５】また、前記回動部材のギヤー部の歯を中央から一方側に向けて回転中心からの距離が大きくなるように形成し、他方側に回転中心からの距離が小さくなる歯を形成することができる。この場合、左右に分割したギヤーを設けるだけの簡単な構造で、ギヤー部材の一方側の回動角度と他方側の回動角度に差があっても、操作ノブ側のモードの間隔を概略均一にすることができる。

【００１６】また、前記回動部材のギヤー部の歯を中央部を回転中心からの距離が小さくなるように形成し、両側部に回転中心からの距離が大きくなるようにすれば、ギヤー部材の回動量に対するワイヤーケーブルの伸縮量が、中央付近では大きく中心から離れるにしたがって小さくなるものであっても、これを補正することができ、操作ノブ側のモードの間隔を概略均一にすることができる。

【００１７】

【発明の実施の形態】次に、本発明の実施例を添付図面に従って説明する。図１，図２は、本発明の第１実施例と第２実施例を適用した自動車のヒーターコントロール装置を示し、このヒーターコントロール装置は、表示板１とベース部２が一体的に形成されており、ベース部２には温風と冷風との混合量を調節するエアミックスダンパー（図示せず）を開度制御させて温度調節する温度調節装置３、風向を切り換える送風モード切換装置４、風量を調節する風量調節装置５、内気循環と外気導入を切り換える内外気切換装置６、エアコンモードにするＡ／Ｃスイッチ７、リヤーウィンドの熱線を通電させて曇りをとるリヤデフスイッチ８等が装着されている。

【００１８】そして、表示板１の前面側には温度調節装置３を作動させる温度調節用の操作ノブ９、送風モード切換装置４を作動させる送風モード切換用の操作ノブ１０、風量調節装置５を作動させる風量調節用の操作ノブ１１、内外気切換装置６を作動させる内外気切換用の操作ノブ１２、Ａ／Ｃスイッチ７をオン・オフするスイッチノブ７ａ、リヤデフスイッチ８をオン・オフするスイッチノブ８ａが配設されている。

【００１９】また、表示板１の前面側を表示面１３とし、この表示面１３には、温度調節用の操作ノブ９の周囲に時計回り方向に温風の量が増加し、反時計回り方向に冷風の量が多くなるように表示された温度調節用の表

示部１４が印刷されている。この表示部１４は時計回り側に太くなっている温風用の表示１４ａと反時計回り側に太くなっている冷風用の表示１４ｂで構成され、この表示１４ａと１４ｂは共に等間隔で分割され、その分割部分がメモリ１４ｃの役目を果たしている。そして、操作ノブ９を回動させるとその指針マーク９ａが各表示を指すようになっている。

【００２０】送風モード切換用の操作ノブ１０の周囲には送風モード用の表示部１５が印刷され、この表示部１５は中央に足元に風を送るＦＯＯＴ用の表示１５ｃを有し、時計回り側にはフロントガラスに向けて風を送るＤＥＦ用の表示１５ｅと足元とフロントガラスの両方に風を送るＦＯＯＴ－ＤＥＦ用の表示１５ｄを有し、反時計回り側には顔に向けて風を送るＦＡＣＥ用の表示１５ａと足元と顔の両方に向けて風を送るＦＯＯＴ－ＦＡＣＥ用の表示１５ｂを有している。そして、これら表示１５ａ乃至１５ｅは概略同間隔で配設されており、操作ノブ１０を回動させるとその指針マーク１０ａが各表示を指すようになっている。

【００２１】風量調節用の操作ノブ１１の周囲には風量調節用の表示部１６が印刷され、この表示部１６は風量調節用であることを示す表示１６ａと風量の段階０乃至４の表示１６ｂを有している。そして操作ノブ１１の指針マーク１１ａが図１で示す「０」の位置を指しているときには風量はゼロで、「１」を指しているときには微風、「４」を指しているときには最大の風量が噴射されるようになっている。また、内外気切換用の操作ノブ１２の左側には内気循環用の表示１２ａ、右側には外気導入用の表示１２ｂが印刷されている。そして、操作ノブ１２が左側にあるときには内気循環となり、右側に移動したときには外気が導入されるようになっている。

【００２２】以下、風量調節装置５、内外気切換装置６、Ａ／Ｃスイッチ７、リヤデフスイッチ８については、従来と変わるところがないので、説明を省略し、温度調節装置３と送風モード切換装置４について更に具体的に説明する。

【００２３】温度調節装置３は本発明の第１実施例を示し、この温度調節装置３の温度調節用の操作ノブ９の背面側には、該操作ノブ９と一体的に回動する回動部材３０が表示板１を挟んで取り付けられている。この回動部材３０には駆動用のギヤー部３１が形成され、この駆動用のギヤー部３１は、図３（ａ）に示すように両側に各４本の歯で構成された大径の歯部３２，３３と中央に５本の歯で構成された小径の歯部３４と、大径の歯部３２，３３と小径の歯部３４との間に形成され、順次径が変化した３本の歯で構成された図中左側の中間の歯部３５及び、右側の中間の歯部３６で構成されている。

【００２４】この中間の歯部３５の歯３５ａ，３５ｂ，３５ｃの小径の歯部３４側には図４（ａ），（ｂ）に示すように、それぞれアール状に切除されたアール部３５ｄ，３５ｅ，３５ｆとなっている。同様に中間の歯部３６の歯３６ａ，３６ｂ，３６ｃも小径の歯部３４側がアール状に切除されたアール部３６ｄ，３６ｅ，３６ｆとなっている。

【００２５】このように、ギヤー部３１の個々の歯を、回転中心からの距離を変化させて設けるようにしているため、ギヤ比の異なる複数のギヤ部材を必要とせず、部品点数が増加することがない。

【００２６】更に回動部材３０の後端部は軸部３７が形成されている。軸部３７はベース部２に突設された筒部２１に形成された軸受部２２に挿通している。

【００２７】そして回動部材３０の後側下方部（図２において紙面の背面側）にはギヤーレバー４０が配設されている。ギヤーレバー４０は前記筒部２１に回動可能に嵌合し筒部２１の外周部に形成された爪部２３により上方側（図２において紙面の手前側）への抜けが阻止されている。

【００２８】このギヤーレバー４０は、図３（ｂ）に示すように、前記回動部材３０の駆動用のギヤー部３１と噛合する被駆動用のギヤー部４１を備え、この被駆動用のギヤー部４１は、両側に前記駆動用のギヤー部３１の大径の歯部３２，３３と噛合する歯部４２，４３と小径の歯部３４と噛合する歯部４４と中間の歯部３５，３６と噛合する歯部４５，４６で構成されている。

【００２９】この歯部４５の歯４５ａ，４５ｂ，４５ｃの歯部４２側には図４（ａ），（ｂ）に示すように、それぞれアール状に切除されたアール部４５ｄ，４５ｅ，４５ｆとなっている。同様に歯部４６の歯４６ａ，４６ｂ，４６ｃも歯部４３側がアール状に切除されたアール部４６ｄ，４６ｅ，４６ｆとなっている。

【００３０】なお、回動部材３０に形成されたギヤー部３１の大径の歯部３２，３３、及び中間の歯部３５，３６の歯３５ａ，３６ａの回動半径ｒ１、歯３５ｂ，３６ｂの回動半径ｒ２、歯３５ｃ，３６ｃの回動半径ｒ３、小径の歯部３４の回動半径ｒ４とし、ｒ１＞ｒ２＞ｒ３＞ｒ４となるように構成している。従って、回動部材３０が同じ角度で回動した場合、大径の歯部３２，３３が被駆動用のギヤー部４１と噛合してギヤーレバー４０を回動させる角度の方が小径の歯部３４が被駆動用のギヤー部４１と噛合してギヤーレバー４０を回動させる角度よりも大きくなる。すなわち、半径ｒ１、ｒ２、ｒ３、ｒ４の大きさに比例してギヤーレバー４０を回動させる角度が大きくなる。

【００３１】また、ギヤーレバー４０の後方には張出部４７が形成され、この張出部４７にはワイヤー取付穴４８が形成されている。そして、ギヤーレバー４０の回動が連結部材としてのワイヤーケーブル４９のインナワイヤ４９ａを介して空調装置側部材の温風と冷風との混合量を調節するエアミックスダンパー（図示せず）を開度制御させるようになっている。

【００３２】そして、ギヤーレバー４０の回動角度とインナワイヤ４９ａの伸縮量の関係は、図１１（ａ）に示した従来例と同様に、ギヤーレバー４０が中立位置からα１度回動したときのインナワイヤ４９ａの伸縮量をｓ１とし、さらにインナワイヤ４９ａをｓ１だけ移動させるために必要なギヤーレバー４０の回動角度をα２、さらにインナワイヤ４９ａをｓ１だけ移動させるために必要なギヤーレバー４０の回動角度をα３とすると、このギヤーレバー４０の回動角度の関係は、α１＜α２＜α３となる。なお、本実施例のギヤレバー４０は従来例のギヤレバー１０４に対して、ギヤー部４１の形状が相違している点で異なる。

【００３３】送風モード切換装置４は本発明の第２実施例を示し、この送風モード切換装置４の送風モード切換用の操作ノブ１０の背面側には、該操作ノブ１０と一体的に回動する回動部材５０が表示板１を挟んで取り付けられている。この回動部材５０には駆動用のギヤー部５１が形成され、この駆動用のギヤー部５１は、図５（ａ）に示すように図中左側に９本の歯で形成された大径の歯部５２と、図中右側に７本の歯で形成された小径の歯部５３と、大径の歯部５２と小径の歯部５３との間に形成され、順次径が変化した３本の歯で構成された中間の歯部５４で構成されている。この中間の歯部５４の各歯の小径の歯部５３側は、それぞれアール状に切除されている。

【００３４】更に回動部材５０の後端部は軸部５５が形成されている。軸部５５はベース部２に突設された筒部２４に形成された軸受部２５に挿通している。

【００３５】そして回動部材５０の後側下方部（図２において紙面の背面側）にはギヤーレバー６０が配設されている。ギヤーレバー６０は前記筒部２４に回動可能に嵌合し筒部２４の外周部に形成された爪部２６により上方側への抜けが防止されている。

【００３６】このギヤーレバー６０には、図５（ｂ）に示すように、前記回動部材５０の駆動用のギヤー部５１と噛合する被駆動用のギヤー部６１を備え、この被駆動用のギヤー部６１は、図中左側に前記駆動用のギヤー部５１の大径の歯部５２と噛合する歯部６２と小径の歯部５３と噛合する歯部６３と中間の歯部５４と噛合する歯部６４とで構成されている。この歯部６４の各歯の歯部６２側は、それぞれアール状に切除されている。

【００３７】なお、図５（ａ）に示すように大径の歯部５２、及び中間の歯部５４の歯５４ａの回動半径ｒ５、中間の歯部５４の歯５４ｂの回動半径ｒ６、歯５４ｃの回動半径ｒ７、小径の歯部５３の回動半径ｒ８とし、ｒ５＞ｒ６＞ｒ７＞ｒ８となるように構成している。従って、回動部材５０が同じ角度で回動した場合、大径の歯部５２が被駆動用のギヤー部６１と噛合してギヤーレバー６０を回動させる角度の方が小径の歯部５３が被駆動用のギヤー部６１と噛合してギヤーレバー６０を回動させる角度よりも大きくなる。すなわち、半径ｒ５、ｒ６、ｒ７、ｒ８の大きさに比例してギヤーレバー６０を回動させる角度が大きくなる。

【００３８】また、ギヤーレバー６０の後方には張出部６５が形成され、この張出部６５にはワイヤー取付穴６６が形成されている。そして、ギヤーレバー６０の回動がワイヤーケーブル６７のインナワイヤ６７ａを介して風向きを変えるダンパーの駆動を制御している。

【００３９】そして、ギヤーレバー６０の回動角度と風向きを変えるダンパーとの関係は、図１１（ｂ）に示した従来例と同様に、ギヤーレバー６０が時計回りに回動してＦＯＯＴ－ＤＥＦの位置にするまで、およびのＦＯＯＴ－ＤＥＦの位置からＤＥＦにするまでの回動角度をα４、α５、ギヤーレバー６０が反時計回りに回動してＦＯＯＴ－ＦＡＣＥの位置にするまで、およびのＦＯＯＴ－ＦＡＣＥの位置からＦＡＣＥにするまでの回動角度をα６、α７とすると、この回動角度の関係は、α５＜α４＜α６＜α７となっている。なお、本実施例のギヤレバー６０は従来例のギヤレバー２０４に対して、ギヤー部６１の形状が相違している点で異なる。

【００４０】次に、温度調節装置３と送風モード切換装置４の動作について説明する。温度調節装置３において、図１に示す状態では温度調節用の操作ノブ９が中立位置にあり、空調装置側部材の温風と冷風との混合量を調節するエアミックスダンパーも中立位置にある。そして、この位置では、回動部材３０の小径の歯部３４が被駆動用のギヤー部４１の歯部４４と噛合している。

【００４１】この位置から操作ノブ９を時計回りに回動させると、回動部材３０も一体的に時計回りに回動し、回動部材３０の小径の歯部３４とギヤーレバー４０の歯部４４が噛合しているため、ギヤーレバー４０は図２において時計回りに回動する。このとき回動部材３０の回動角度に対するギヤーレバー４０の回動角度は小さい割合で回動する。そして、操作ノブ９を所定角度（概略最大角度の１／３）まで回動すると、小径の歯部３４は歯部４４との噛合が外れ、次に中間の歯部３６が歯部４６と噛合した状態となる。そして、ギヤーレバー４０が時計回りに角度α１だけ回動し、ギヤーレバー４０のワイヤー取付穴４８に取り付けられたインナワイヤ４９ａを縮み方向に距離ｓ１だけ作動させ、空調装置側部材のエアミックスダンパーを駆動して冷風を減少させ、温風の量を増加させる。

【００４２】そして、更に操作ノブ９を時計回りに回動させると、中間の歯部３６と歯部４６とが噛合してギヤーレバー４０を更に時計回りに回動する。このとき、回動部材３０の回動角度に対するギヤーレバー４０の回動角度の割合が増加しながらギヤーレバー４０が回動する。そして、操作ノブ９を所定角度（概略最大角度の２／３）まで回動すると、中間の歯部３６は歯部４６との噛合が外れ、次に大径の歯部３３が歯部４３と噛合した

状態となる。そして、ギヤーレバー４０が時計回りに角度α２だけ回動し、インナワイヤ４９ａがさらに縮み方向に距離ｓ１だけ作動して、空調装置側部材のエアミックスダンパーを駆動してさらに冷風を減少させ、温風の量を増加させる。

【００４３】このとき詳細には、最初に、中間の歯部３６の歯３６ｃと歯部４６の歯４６ｃが噛み合い、次に歯３６ｂと歯４６ｂ、さらに歯３６ａと歯４６ａが噛み合い、そして、噛み合い後には順次それぞれの歯の噛合が解除されていく。しかし、歯部４６において歯４６ｂよりも歯４６ｃのほうが回動部材３０側により突出した位置に設けられているため係合代が大きくなり、歯３６ｃが歯部４６より抜けにくい構成となるが、歯４６ｃにアール部４６ｆを形成すると共に、歯３６ｃにもアール部３６ｆを形成して係合代が小さくなるようにしているため、歯３６ｃが歯部４６から抜け出す際に、歯３６ｃが歯４６ｃと干渉して回動部材３０の回動を妨げるようなことがない。さらに、中間の歯部３６の歯３６ａ，３６ｂ及び歯部４６の歯４６ａ，４６ｂにも同様にアール部３６ｄ，３６ｅ，４６ｄ，４６ｅを形成しているので、スムーズに回動部材３０の回動操作を行うことができる。なお、歯３６ｃと歯４６ｃの両方にアール部を設けることにより、より係合代を小さくすることができるようになる。

【００４４】更に操作ノブ９を時計回りに回動させると、大径の歯部３３と歯部４３とが噛合してギヤーレバー４０を更に時計回りに回動する。このとき回動部材３０の回動角度に対するギヤーレバー４０の回動角度は大きい割合で回動する。そして、操作ノブ９を最大角度まで回動させるとギヤーレバー４０が時計回りに角度α３だけ回動し、インナワイヤ４９ａがさらに縮み方向に距離ｓ１だけ作動して、空調装置側部材のエアミックスダンパーは温風のみにして高温にセットされる。

【００４５】これとは反対に中立位置から操作ノブ９を反時計回りに回動させると、同様にギヤーレバー４０は図２において反時計回りに回動する。このときも回動部材３０の回動角度に対するギヤーレバー４０の回動角度は小さい割合で回動する。そして所定角度（概略最大角度の１／３）まで回動すると、小径の歯部３４は歯部４４との噛合が外れ、続いて中間の歯部３５が歯部４５と噛合し、ギヤーレバー４０が反時計回りに角度α１だけ回動し、インナワイヤ４９ａを伸び方向に距離ｓ１だけ作動させ、空調装置側部材のエアミックスダンパーを駆動して温風を減少させ、冷風の量を増加させる。

【００４６】そして、更に操作ノブ９を反時計回りに回動させると、中間の歯部３５と歯部４５とが噛合してギヤーレバー４０を更に反時計回りに回動する。このときも、回動部材３０の回動角度に対するギヤーレバー４０の回動角度の割合が増加しながらギヤーレバー４０が回動する。そして所定角度（概略最大角度の２／３）まで回動すると、中間の歯部３５は歯部４５との噛合が外れ、次に大径の歯部３２が歯部４２と噛合した状態となる。そして、ギヤーレバー４０が反時計回りに角度α２だけ回動し、インナワイヤ４９ａがさらに伸び方向に距離ｓ１だけ作動して、空調装置側部材のエアミックスダンパーを駆動してさらに温風を減少させ、冷風の量を増加させる。

【００４７】このとき詳細には、最初に、中間の歯部３５の歯３５ｃと歯部４５の歯４５ｃが噛み合い、次に歯３５ｂと歯４５ｂ、さらに歯３５ａと歯４５ａが噛み合い、そして、噛み合い後には順次それぞれの歯の噛合が解除されていく。そして、この中間の歯部３５と歯部４５の各歯にはアール部３５ｄ，３５ｅ，３５ｆ及びアール部４５ｄ，４５ｅ，４５ｆが設けられているため、前記中間の歯部３６と歯部４６との噛み合い時と同様に、中間の歯部３５と歯部４５とが干渉することなく、スムーズに回動部材３０の回動操作を行うことができる。

【００４８】そして、操作ノブ９を更に反時計回りに回動させると、ギヤーレバー４０を更に反時計回りに回動する。このときも回動部材３０の回動角度に対するギヤーレバー４０の回動角度は大きい割合で回動する。そして、操作ノブ９を最大角度まで回動させるとギヤーレバー４０が反時計回りに角度α３だけ回動し、インナワイヤ４９ａがさらに伸び方向に距離ｓ１だけ作動して、空調装置側部材のエアミックスダンパーは冷風のみにして低温にセットされる。

【００４９】上記したように、操作ノブ９を中立位置から所定角度、時計回り又は反時計回りに回動させた場合には、回動部材３０の回動角度に対するギヤーレバー４０の回動角度は小さい割合で回動し、所定角度を超えて回動させた場合は、回動部材３０の回動角度に対するギヤーレバー４０の回動角度が次第に増加して、最後には大きい割合で回動させる。したがって、操作ノブ９を一定の角度回動操作したときのギヤーレバー４０の回動角度を変化させることができるため、温度調節用の操作ノブ９の回動角度に比例してインナワイヤ４９ａの縮量を変化させることができるようになる。

【００５０】一方、送風モード切換装置４において、図１に示す状態では送風モード切換用の操作ノブ１０が中立位置にあり、送風モード切換装置４はＦＯＯＴの位置にあり足元に風を送るようになっている。そして、この位置では、図５（ｂ）に示すように回動部材５０の中間の歯部５４が被駆動用のギヤー部６１の歯部６４と噛合している。

【００５１】従って、この位置から操作ノブ１０を時計回りに回動させると、回動部材５０が時計回りに回動し、回動部材５０の中間の歯部５４と被駆動用のギヤー部６１の歯部６４が噛合した後、引き続いて小径の歯部５３と歯部６３が噛合して、ギヤーレバー６０は図２において時計回りに回動し、ワイヤーケーブル６７のイン

ナワイヤ６７ａを介して風向きを変えるダンパーを駆動する。このとき回動部材５０の回動角度に対するギヤーレバー６０の回動角度は次第に減少し、小径の歯部５３と被駆動用のギヤー部６１が噛合して回動している状態では小さい割合で回動する。そして、操作ノブ１０をＦＯＯＴ－ＤＥＦ用の表示１５ｄの位置まで回動すると、ギヤーレバー６０が角度α４だけ回動してインナワイヤ６７ａを作動させ、風向きを変えるダンパーはＦＯＯＴ－ＤＥＦの位置となり、足元とフロントガラスに向けて送風するようになっている。更に操作ノブ１０をＤＥＦ用の表示１５ｅの位置まで時計回りに回動させると、ギヤーレバー６０は小さい割合で、更に時計回りに回動し、ギヤーレバー６０がさらに角度α５だけ回動してインナワイヤ６７ａを作動させ、風向きを変えるダンパーはＤＥＦの位置となり、足元への送風を止めてフロントガラスにのみ向けて送風するようになっている。

【００５２】これとは反対に中立位置から操作ノブ１０を反時計回りに回動させると、回動部材５０の中間の歯部５４と被駆動用のギヤー部６１の歯部６４が噛合した後、引き続いて大径の歯部５２と歯部６２が噛合して、ギヤーレバー６０は図２において反時計回りに回動する。このときは回動部材５０の回動角度に対するギヤーレバー６０の回動角度は次第に増加し、大径の歯部５２と歯部６２が噛合して回動している状態では大きい割合で回動する。そして、操作ノブ１０をＦＯＯＴ－ＦＡＣＥ用の表示１５ｂの位置まで回動すると、ギヤーレバー６０が角度α６だけ回動してインナワイヤ６７ａを作動させ、風向きを変えるダンパーはＦＯＯＴ－ＦＡＣＥの位置となり、足元と顔方向に送風するようになっている。更に、操作ノブ１０をＦＡＣＥ用の表示１５ａの位置まで反時計回りに回動させると、ギヤーレバー６０は大さい割合で角度α７だけ回動してインナワイヤ６７ａを作動させ、風向きを変えるダンパーはＦＡＣＥの位置となり、足元への送風を止めて顔方向にのみ送風するようになっている。

【００５３】上記したように、操作ノブ１０を中立位置から時計回りに回動させた場合には、回動部材５０の回動角度に対するギヤーレバー６０の回動角度が次第に減少して、最後には小さい割合でギヤーレバー６０を回動させる。一方、操作ノブ１０を中立位置から反時計回りに回動させた場合には、回動部材５０の回動角度に対するギヤーレバー６０の回動角度は次第に増加して、最後には大きい割合でギヤーレバー６０を回動させる。したがって、操作ノブ１０を一定の角度回動操作したときのギヤーレバー６０の回動角度を変化させることができるようになる。

【００５４】次に、回動部材及びギヤーレバーの変形例について、以下、図面にしたがって説明する。なお、図１に示す表示パネル１に設けられた操作ノブ９，１０、表示部１４，１５及びスイッチ等の各部材は、前記第１，第２実施例と同様であるため、その説明は省略する。

【００５５】図６は、本発明の第３実施例を適用した自動車のヒーターコントロール装置を示し、このヒーターコントロール装置の温度調節用の操作ノブ９の裏面側には温度調節装置７０が設けられ、送風モード切換用の操作ノブ１０の裏面側には送風モード切換装置７１が設けられている。

【００５６】送風モード切換装置７１は本発明の第３実施例を示し、この送風モード切換装置７１には、操作ノブ１０と一体的に回動する回動部材７２が表示板１を挟んで、ベース部２に設けられた軸挿通孔２ａに回動自在に取り付けられている。この回動部材７２の後端部には駆動用のギヤー部７３が形成され、この駆動用のギヤー部７３は、図８に示すように図中左側から反時計回り順に３本の歯で形成された小径の歯部７４と、順次径が変化した８本の歯で形成された中間の歯部７５と、３本の歯で形成された大径の歯部７６と、順次径が変化した４本の歯で形成された終端の歯部７７で構成されている。

【００５７】そして回動部材７２の後側（図６において紙面の手前側）には、ギヤーレバー８０が配設されている。ギヤーレバー８０は、ベース部２に回動部材７２の軸方向に突設された筒部７８に回動可能に嵌合し、筒部７８の外周部に形成された爪部７９により後方側への抜けが阻止されている。

【００５８】このギヤーレバー８０の回動軸の近傍には、回動部材７２側に突出した段差部８１が設けられ、その段差部８１の外周面には回動部材７２の駆動用のギヤー部７３と噛合する被駆動用のギヤー部８２が形成されている。この被駆動用のギヤー部８２は、図８中左側から時計回り順に前記駆動用のギヤー部７３の小径の歯部７４と噛合する歯部８３と、中間の歯部７５と噛合する歯部８４と、大径の歯部７６と噛合する歯部８５と、終端の歯部７７と噛合する歯部８６で構成されている。

【００５９】なお、回動部材７２に形成されたギヤー部７３の大径の歯部７６の回動半径ｒ９、小径の歯部７４の回動半径ｒ１０とし、ｒ９＞ｒ１０となるように構成している。また、中間の歯部７５の各歯の回動半径は、ｒ９より小さく、ｒ１０より大きい範囲内において、小径の歯部７４側の歯から順に、大径の歯部７６側に向かって回動半径が順次大きくなるように構成されている。さらに、終端の歯部７７の各歯の回動半径は、大径の歯部７６側の歯から順に、回動半径が順次小さくなるように構成され、その回動半径の歯ごとの減少比率は、中間の歯部７５の回動半径の増加比率と同等となるように構成されている。

【００６０】また、ギヤーレバー８０の外周には張出部８７が形成され、この張出部８７にはワイヤー取付穴８８が形成されている。そして、ギヤーレバー８０の回動がワイヤーケーブル９１のインナワイヤ９１ａを介して

風向きを変えるダンパーの駆動を制御している。

【００６１】なお、本実施例においては、ギヤーレバー８０が図７に示す中立の位置にあるときには、風向きを変えるダンパーはＦＯＯＴの位置となり、中立位置から時計回りに角度α８だけ回動すると、風向きを変えるダンパーはＦＯＯＴ－ＦＡＣＥの位置となり、さらに時計回りに角度α９だけ回動すると、風向きを変えるダンパーはＦＯＯＴの位置となる。また、中立位置から反時計回りに角度α１０だけ回動すると、風向きを変えるダンパーはＦＯＯＴ－ＤＥＦの位置となり、さらに時計回りに角度α１１だけ回動すると、風向きを変えるダンパーはＤＥＦの位置となるように構成されている。そして、その回動角度の関係は、α９＜α８＜α１０及び、α１０＝α１１の関係となっている。

【００６２】次に、送風モード切換装置７１の動作について説明する。送風モード切換装置７１において、図７に示す状態では送風モード切換用の操作ノブ１０が中立位置にあり、送風モード切換装置７１はＦＯＯＴの位置にあり足元に風を送るようになっている。そして、この位置では、図８に示すように回動部材７２の中間の歯部７５が被駆動用のギヤー部８２の歯部８４と噛合している。

【００６３】従って、この位置から操作ノブ１０を時計回りに回動させると、回動部材７２が時計回りに回動し、回動部材７２の中間の歯部７５と被駆動用のギヤー部８２の歯部８４が噛合した後、引き続いて大径の歯部７６と歯部８５が噛合して、ギヤーレバー８０は図７において反時計回りに回動し、ワイヤーケーブル９１のインナワイヤ９１ａを介して風向きを変えるダンパーを駆動する。このとき回動部材７２の回動角度に対するギヤーレバー８０の回動角度は次第に増加し、大径の歯部７６と歯部８５が噛合して回動している状態では大きい割合で回動する。そして、操作ノブ１０をＦＯＯＴ－ＤＥＦ用の表示１５ｄの位置まで回動すると、ギヤーレバー８０が角度α１０だけ回動してインナワイヤ９１ａを作動させ、風向きを変えるダンパーはＦＯＯＴ－ＤＥＦの位置となり、足元とフロントガラスに向けて送風するようになっている。

【００６４】更に操作ノブ１０をＤＥＦ用の表示１５ｅの位置まで時計回りに回動させると、終端の歯部７７と歯部８６が噛合して、ギヤーレバー８０は図７において反時計回りに回動する。このとき回動部材７２の回動角度に対するギヤーレバー８０の回動角度は次第に減少し、ギヤーレバー８０が角度α１１だけ回動してインナワイヤ９１ａを作動させ、風向きを変えるダンパーはＤＥＦの位置となり、足元への送風を止めてフロントガラスにのみ向けて送風するようになっている。

【００６５】これとは反対に中立位置から操作ノブ１０を反時計回りに回動させると、回動部材７２の中間の歯部７５と被駆動用のギヤー部８２の歯部８４が噛合した後、引き続いて小径の歯部７４と歯部８３が噛合して、ギヤーレバー８０は図７において時計回りに回動する。このときは回動部材７２の回動角度に対するギヤーレバー８０の回動角度は次第に減少し、小径の歯部７４と歯部８３が噛合して回動している状態では小さい割合で回動する。その際、ＦＯＯＴ－ＦＡＣＥ用の表示１５ｂの位置まで回動すると、ギヤーレバー８０が角度α８だけ回動してインナワイヤ９１ａを作動させ、風向きを変えるダンパーはＦＯＯＴ－ＦＡＣＥの位置となり、足元と顔方向に送風するようになっている。更に操作ノブ１０をＦＡＣＥ用の表示１５ａの位置まで反時計回りに回動させると、ギヤーレバー８０は小さい割合で、更に時計回りに回動し、ギヤーレバー８０が角度α９だけさらに回動してインナワイヤ９１ａを作動させ、風向きを変えるダンパーはＦＡＣＥの位置となり、足元への送風を止めて顔方向にのみ送風するようになる。

【００６６】よって、上記各実施例から明らかなように、所望するギヤーレバーの回動角度の状態に応じて、適宜ギヤー部の個々の歯の回転中心からの距離や歯の枚数を変更しても、本発明の実施の形態と同様の効果を得ることができる。

【００６７】

【発明の効果】以上説明したように、本発明のヒーターコントロール装置によれば、操作ノブの回動をギヤーを介して連結部材に伝達して空調装置側部材を駆動するヒーターコントロール装置において、連結用のギヤー部の個々の歯の回転中心からの距離を変化させ、操作ノブの回動位置に応じて、伝達比を異ならせるようにしているので、簡単な構造で、部品点数を増加させることなく、操作ノブの回動範囲を均一にすることができる。

【００６８】また、左右に回転中心からの距離が違うギヤーを設けるだけの簡単な構造で、ギヤーレバーの一方側の回動角度と他方側の回動角度に差があっても、操作ノブ側のモードの間隔を均一にすることができる

【００６９】さらに、回動部材のギヤー部の歯を中央部を回転中心からの距離が小さくなるように形成し、両側部に回転中心からの距離が大きくなるようにするれば、ギヤー部材の回動量に対する連結部材の伸縮量が、中央付近では大きく中心から離れるにしたがって小さくなるものであっても、これを補正することができ、操作ノブ側のモードの間隔を均一にすることができる。

【図面の簡単な説明】

【図１】本発明のヒーターコントロール装置の正面図である。

【図２】図１の平面図である。

【図３】第１実施例の回動部材とギヤーレバーを示したものであり、（ａ）は回動部材のギヤー部、（ｂ）は回動部材とギヤーレバーの関係を示した一部断面側面図である。

【図４】第１実施例の回動部材のギヤー部を示し、

（ａ）は左側の中間の歯部、（ｂ）は右側の中間の歯部の噛み合いの状態を示す拡大図である。

【図５】第２実施例の回動部材とギヤーレバーを示したものであり、（ａ）は回動部材のギヤー部、（ｂ）は回動部材とギヤーレバーの関係を示した一部断面側面図である。

【図６】第３実施例のヒーターコントロール装置の背面図である。

【図７】第３実施例のギヤーレバーの回動範囲を操作ノブ側から見た図である。

【図８】図７の拡大図であり、ギヤー部の噛み合いの関係を示した図である。

【図９】従来実施例のヒーターコントロール装置の正面図である。

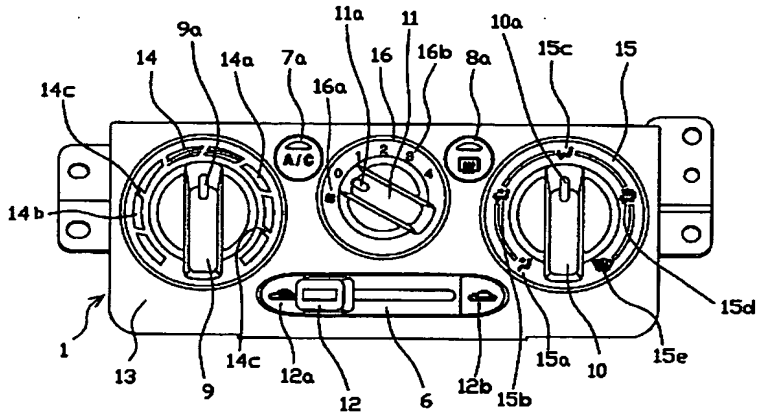
＊【図１０】図９の平面図である。

【図１１】（ａ）は従来実施例の温度調節装置のギヤーレバーの回動範囲と連結部材の伸縮量の関係を示した図、（ｂ）は従来実施例の送風モード切換装置のギヤーレバーの回動範囲を示した図である。

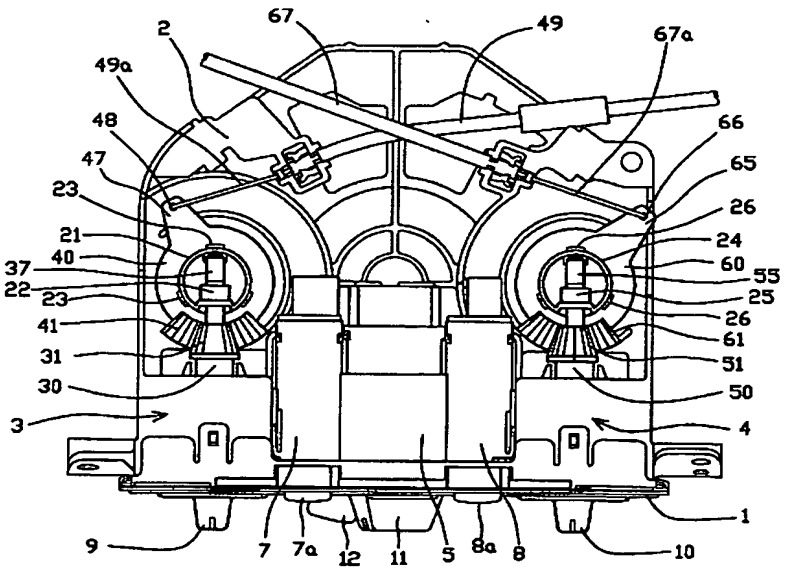
【符号の説明】

３　温度調節装置
４、７１　送風モード切換装置
９、１０　操作ノブ
３０、５０、７２　回動部材
３１、５１、７３　ギヤー部
４０、６０、８０　ギヤー部材（ギヤーレバー）
４１、６１、８２　被駆動用のギヤー部
４９、６７、９１　連結部材（ワイヤーケーブル）

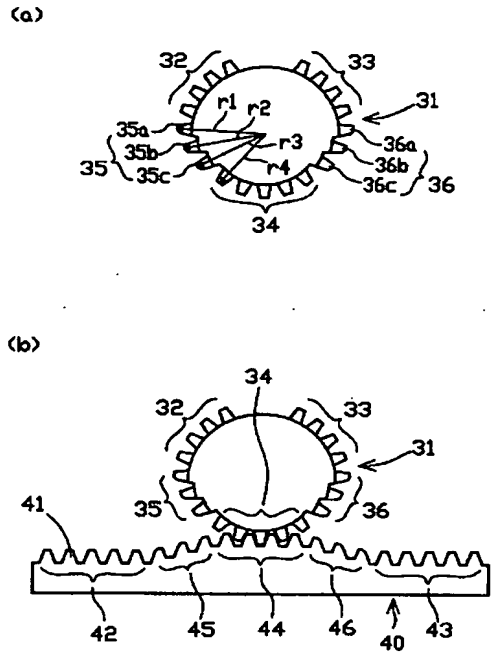
【図１】



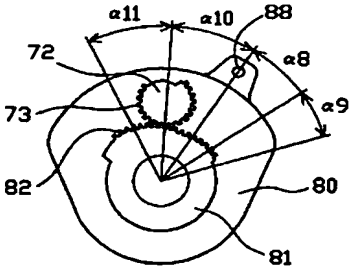
【図２】



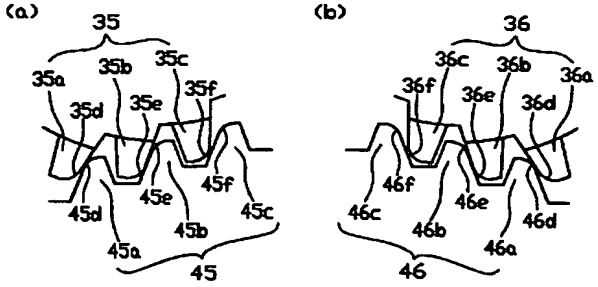
【図３】



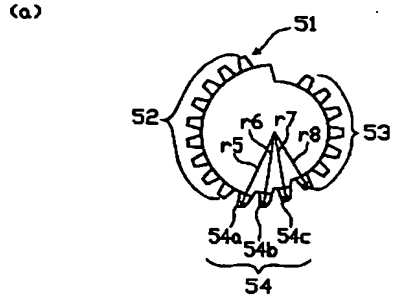
【図７】



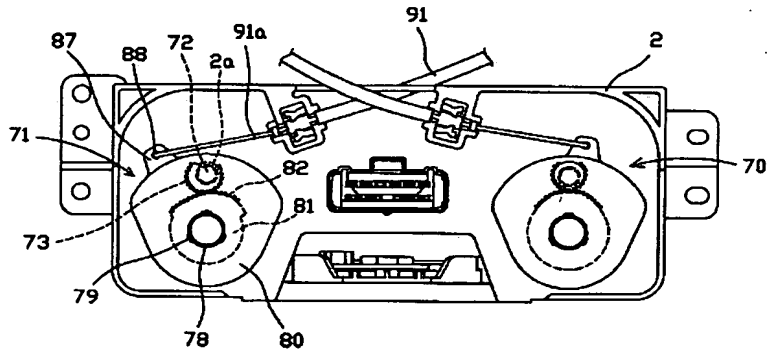
【図４】


(a)
35
35a
35b
35c
35d
35e
35f
45d
45e
45f
45c
45b
45a
45
(b)
36
36c
36b
36a
36f
36e
36d
46f
46c
46e
46d
46b
46a
46

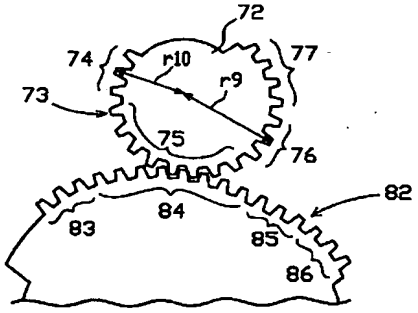
【図５】


(a)
51
52
53
r6
r7
r5
r8
54a
54c
54b
54
(b)
51
52
53
54a
54c
54
61
62
54b
64
60
63

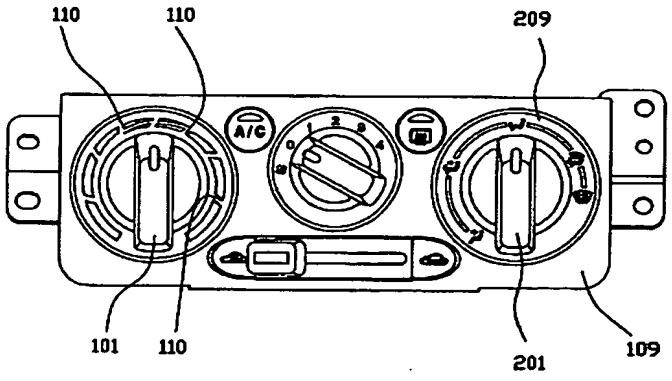
【図６】


87
88
72
91a
2a
91
2
71
82
81
73
70
79
78
80

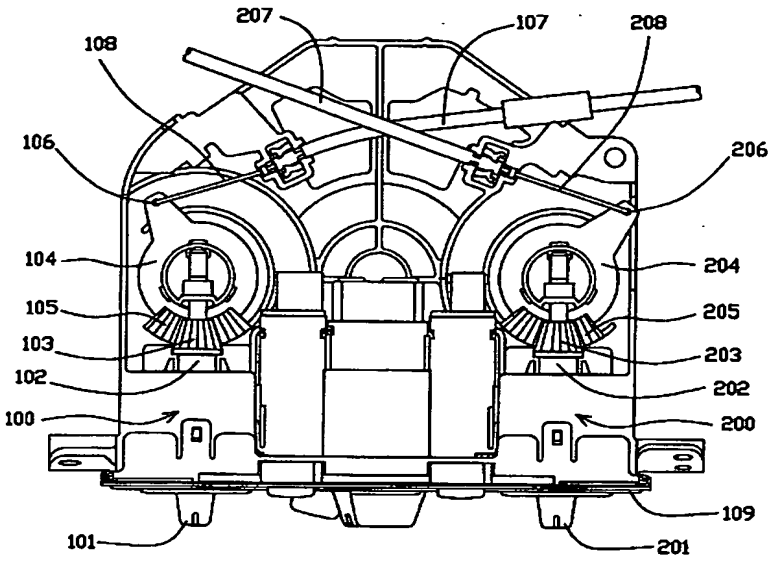
【図８】


72
74
r10
77
r9
73
75
76
82
84
83
85
86

【図９】


110
110
209
A/C
101
110
201
109

【図１０】


207
107
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108
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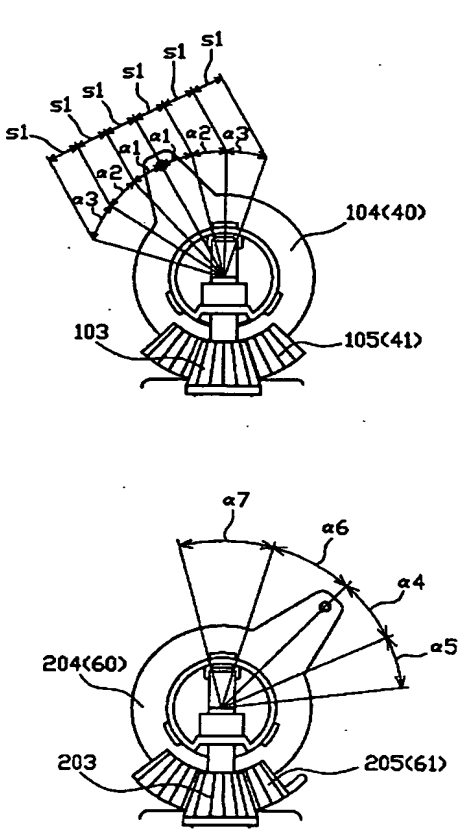
105
205
103
203
102
202
100
200
109
101
201

【図１１】


(a)
s1
α1
α2
α3
104(40)
103
105(41)
(b)
α7
α6
α4
α5
204(60)
203
205(61)